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(54) BENZAMIDOXIME DERIVATIVE, PROCESS FOR PRODUCTION THEREOF, AND AGROHORTICULTURAL BACTERICIDE

BENZAMIDOXIMDERIVATE, VERFAHREN ZU IHRER HERSTELLUNG UND EIN BAKTERIZID FÜR LANDWIRTSCHAFT UND GARTENBAU

DERIVE DE BENZAMIDOXIME, PROCEDE DE PRODUCTION, ET BACTERICIDE AGROHORTICOLE

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Description

Technical Field:

[0001] The present invention relates to novel benzamidoxime derivatives. methods for preparation thereof and fungicides for agricultural and horticultural uses.

Background Art:

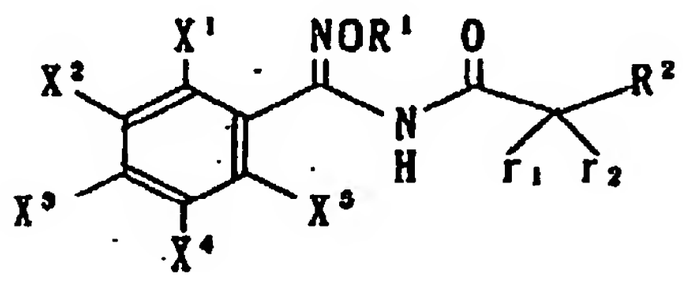
[0002] In farming of agricultural and horticultural crops in the past, various fungicides have been used for the control of plant diseases on the crops, however, many of them are not enough useful because of their insufficient effectiveness in plant disease control, the limitation in their use due to the appearance of resistant strain of plant disease pathogens to the fungicides, the development of phytotoxicity and contamination to the crops, and/or their strong toxicity to humans. domestic animals and wildlife. For this reason, there is still intensive requirement to develop safe fungicides for agricultural and horticultural uses, which do not have the disadvantages as described above.

[0003] Some benzamidoxime derivatives, which are close to the compounds of the present invention, and their use as fungicides have been disclosed in Japanese Patent Laid-opened No. Hei 2-6453 Gazette. However, it is obvious that the biological activity of those benzamide oxime derivatives are not enough in the practical plant disease control.

[0004] Therefore. it is an object of the present Invention to provide novel compounds which can be a fungicide for agricultural and horticultural use capable of advantageously manufacturing the compound in an industrial scale, controlling plant diseases steadily and using it safely.

Disclosure of the Invention:

[0005] The present Invention is directed to benzamidoxime derivatives represented by a general formula [I];



. . . [I]

wherein R^1 is unsubstituted or substituted C_1 - C_4 alkyl, unsubstituted or substituted C_2 - C_4 alkenyl or unsubstituted or substituted C_2 - C_4 alkynyl, R^2 is phenyl optionally having substituents or heterocycle optionally having substituents, $X^1$is-CF_3 X^2, X^3, X^4 and X^5 are each independently hydrogen, halogen, C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_1 - C_4 alkoxy, C_1 - C_4 haloalkoxy, C_1 - C_4 alkylthio, C_1 - C_4 alkylsulfinyl, C_1 - C_4 alkylsulfonyl, nitro, amino or C_1 - C_4 alkylcarbonylamino, and r^1 and r^2 are each independently hydrogen, halogen, C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_1 - C_4 alkoxy, C_1 - C_4 alkylthio or amino, or r^1 and r^2 together may form a carbonyl.

[0006] The present invention is also directed to methods for preparation thereof and fungicides for agricultural and horticultural use comprising the said derivatives.

[0007] In the present invention, for the examples of C_1 - C_4 alkyl of the unsubstituted or substituted C_1 - C_4 alkyl represented by R^1, methyl, ethyl, propyl, isopropyl, butyl, Isobutyl and t-butyl can be given.

[0008] For the examples of C_2 - C_4 alkenyl of the unsubstituted or substituted C_2 - C_4 alkenyl represented by R^1, vinyl, 1-propenyl, 2-propenyl, Isopropenyl, 1-butenyl, 2-butenyl and 3-butenyl can be given.

[0009] For the examples of C_2 - C_4 alkynyl of the unsubstituted or substituted C_2 - C_4 alkynyl represented by R^1, ethynyl, propargyl, 2-butynyl and 3-butynyl can be given.

[0010] Further, according to formula I' R^1 may be a group represented by general formula R^3-CH_2 wherein R^3 is a group selected from; C_3 - C_8 cycloalkyl, such as cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl and cycloheptyl; C_3 - C_8 halocycloalkyl, such as 1-fluorocyclopropyl, 2-fluorocyclopropyl, 1-chlorocyclopropyl, 2-chlorocyclopropyl, 2,2-difluorocyclopropyl, 2,2-dichlorocyclopropyl, 2-fluorocyclopentyl, 3-fluorocyclopentyl, 2-chlorocyclopentyl, 3-chlorocyclopentyl, 3.4-difluorocyclohexyl, 3,4-dichlorocyclohexyl and 3,4-dibromosilocyclohexy 1; C_3 - C_8 cycloalkenyl, such as 2-cyclohexenyl and 3-cyclohexenyl; halogens, such as fluorine, chlorine, bromine and Iodine; C_1 - C_4 alkoxy, such as methoxy, ethoxy, propyloxy, isopropyloxy, butyloxy, isobutyloxy and t-butyloxy; unsubstituted, mono-substituted or di-substituted amino by C_1 - C_4 alkyl, such as amino, methylamino and dimethylamino; unsubstituted, mono-substituted

or di-substituted carbamoyl by C_1 - C_4 alkyl, such as carbamoyl, methylcarbamoyl and dimethylcarbamoyl; C_1 - C_4 alkylthio, such as methylthio, ethylthio, propylthio and isopropylthio; C_1 - C_4 alkylsulfinyl, such as methylsulfinyl and ethylsulfinyl; C_1 - C_4 alkylsulfonyl, such as methylsulfonyl and ethylsulfonyl; C_1 - C_4 alkoxycarbonyl, such as methoxycarbonyl and ethoxycarbonyl; carboxy and cyano, can be given for the examples of the substituents for any of C_1 - C_4 alkyl, C_2 - C_4 alkenyl and C_2 - C_4 alkynyl.

[0011] However, straight chain or branched C_1 - C_4 alkyl being unsubstituted or substituted is more preferable for the examples of the substituent represented by R^1. More particularly, straight chain or branched C_1 - C_4 alkyl, such as methyl, ethyl, propyl, isopropyl, butyl, s-butyl and t-butyl; a group represented by a general formula, R^3CH_2, wherein R^3 is C_3 - C_8 cycloalkyl, C_1 - C_3 haloalkyl, C_1 - C_3 alkoxy, C_1 - C_3 alkylthio, C_1 - C_3 alkylsulfinyl, C_1 - C_3 alkylsulfonyl, C_1 - C_3 alkoxycarbonyl, cyano, amino, C_1 - C_3 monoalkylamino, C_1 - C_3 dialkylamino or acylamino, such as C_1 - C_8 cycloalkylmethyl including cyclopropylmethyl, cyclobutylmethyl, cyclopentylmethyl and cyclohexylmethyl, C_1 - C_8 cyclohaloalkylmethyl including 2-fluorocyclopropylmethyl, 1-fluorocyclopropylmethyl, 1,2-difluorocyclopropylmethyl and 3,4-dibromocyclohexyl, C_1 - C_4 haloalkyl including 2-chloroethyl, 2-fluoroethyl, 2,2-dichloroethyl, 2,2-difluoroethyl and 2,2,2-trifluoroethyl, C_1 - C_4 alkoxymethyl including methoxymethyl, ethoxymethyl and propoxymethyl, C_2 - C_4 alkynyl including propargyl, C_2 - C_4 alkenyl including allyl, 2-butenyl, cyanomethyl, alkoxycarbonylmethyl including methoxycarbonylmethyl and ethoxycarbonylmethyl, alkylthiomethyl including methylthiomethyl and ethylthiomethyl, alkylsulfinylmethyl including methylsulfinylmethyl and ethylsulfinylmethyl, alkylsulfonylmethyl including methylsulfonylmethyl and ethylsulfonylmethyl, aminomethyl, substituted aminomethyl including N-methylaminomethyl, N,N-dimethylaminomethyl, N-acetylaminomethyl and N-benzoylaminomethyl, can be given for the examples of the straight chain or branched C_1 - C_4 alkyl being unsubstituted or unsubstituted described above.

[0012] For the examples of heterocycle of the unsubstituted or substituted heterocycle group represented by R^2, 5- or 6-membered aromatic heterocycle containing 1 - 4 heteroatoms, such as N. 0 and S, such as pyridine ring, fran ring, thiophene ring. pyrazole ring, imidazole ring, triazole ring, pyrrole ring, pyrazine ring. pyrimidine ring, pyridazine ring, oxazole ring, isoxazole ring and thiazole ring, can be given.

[0013] The substituents for phenyl and heterocycle represented by R^2 may substitute one or more optional positions of the benzene ring or the heterocycle thereof and may be different with each other if 2 or more positions are substituted thereby. For the preferable examples of the substituents described hereinabove, halogens, such as fluorine, chlorine and bromine, C_1 - C_4 alkyl, such as methyl, ethyl, propyl, isopropyl, butyl and t-butyl, C_1 - C_4 alkoxy, such as methoxy, ethoxy, propoxy, isopropoxy, butoxy and t-butoxy, C_2 - C_4 alkenyloxy, such as allyoxy and crotyloxy, C_2 - C_4 alkynyloxy, such as propargyloxy, C_1 - C_4 haloalkyl, such as chloromethyl, fluoromethyl, bromomethyl, dichloromethyl, difluoromethyl, trichloromethyl, trifluoromethyl, tribromomethyl, trifluoroethoxy and pentafluoroethoxy, and C_1 - C_4 haloalkoxy, such as chloromethoxy, fluoromethoxy, bromomethoxy, dichloromethoxy, difluoromethoxy, trichloromethoxy, trifluoromethoxy, tribromomethoxy and trifluoroethoxy, can be given.

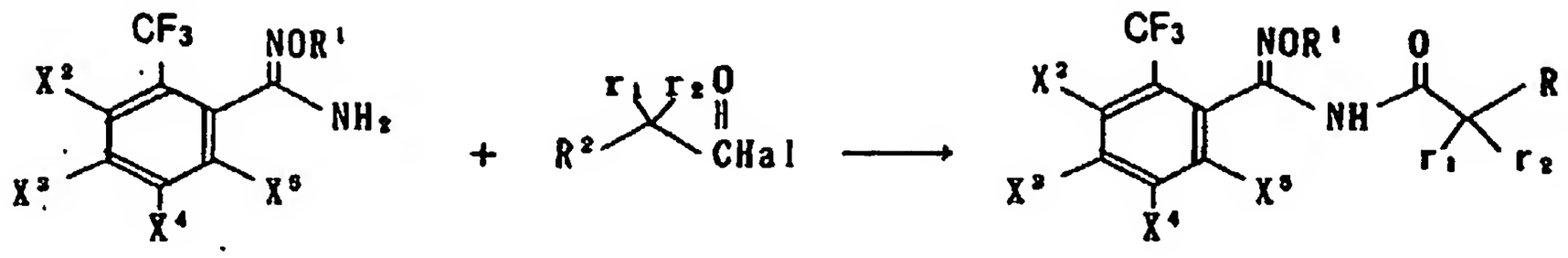
[0014] For the examples of halogen atoms represented by X^2, X^3, X^4 and X^5, fluorine, chlorine, bromine and iodine can be given, and for the examples of the C_1 - C_4 alkyl represented by X^2, X^3, X^4 and X^5, methyl, ethyl, propyl, isopropyl, butyl, isobutyl and t-butyl can be given, and further for the examples of the C_1 - C_4 haloalkyl represented by X^2, X^3, X^4 and X^5, straight chain or branched C_1 - C_4 haloalkyl, such as chloromethyl, dichloromethyl, trichloromethyl, difluoromethyl, trifluoromethyl. bromomethyl, dibromomethyl, chloroethyl, fluoroethyl, dichloroethyl, difluoroethyl, trifluoroethyl, tetrafluoroethyl, pentafluoroethyl, chloropropyl, fluoropropyl, perfluoropropyl, chloroisopropyl, fluoroisopropyl, perfluoroisopropyl, chlorobutyl, fluorobutyl, perfluorobutyl, chloroisobutyl, fluoroisobutyl, perfluoroisobutyl, chloro-s-butyl, fluoro-s-butyl, perfluoro-s-butyl, chloro-t-butyl, fluoro-t-butyl and perfluoro-t-butyl, can be given, and still for the examples of the C_1 - C_4 alkoxy represented by X^2, X^3, X^4 and X^5, methoxy, ethoxy, propyloxy, isopropyloxy, butyloxy, isobutyloxy and t-butyloxy can be given. In addition, for the examples of the C_1 - C_4 alkylthio represented by X^2, X^3, X^4 and X^5, methylthio, ethylthio, propylthio, isopropylthio, butylthio, isobutylthio and t-butylthio can be given, and for the examples of the C_1 - C_4 haloalkoxy represented by X^2, X^3, X^4 and X^5, trifluoromethoxy, difluoromethoxy, trichloromethoxy, trifluoroethoxy and tetrafluoroethoxy can be given.

[0015] Furthermore, for the examples of the groups represented by r^1 and r^2, which may be the same or different groups with each other, hydrogen, halogen atoms, such as fluorine, chlorine, bromine and iodine, C_1 - C_4 alkyl, such as methyl, ethyl, propyl, isopropyl, butyl and t-butyl, C_1 - C_4 alkoxy, such as methoxy, ethoxy, propoxy, isopropoxy. butoxy and t-butoxy, C_1 - C_4 alkylthio, such as methylthio, ethylthio, propylthio, ispropylthio, butylthio and t-butylthio, C_1 - C_4 haloalkyl, such as trifluoromethyl, trichloromethyl, tribromomethyl, trifluoroethyl, chloromethyl, fluoromethyl and pentafluoroethyl, and amino can be given.

[0016] Moreover, r^1 and r^2 may in together form a carbonyl group.

(Manufacturing of the Compounds)

[0017] The compounds of the present invention can be manufactured according to the following reaction formula;



(II) (III) (I)

wherein Hal represents halogen, and R^1, R^2, X^2, X^3, X^4, X^5, r_1 and r_2 are as described above.

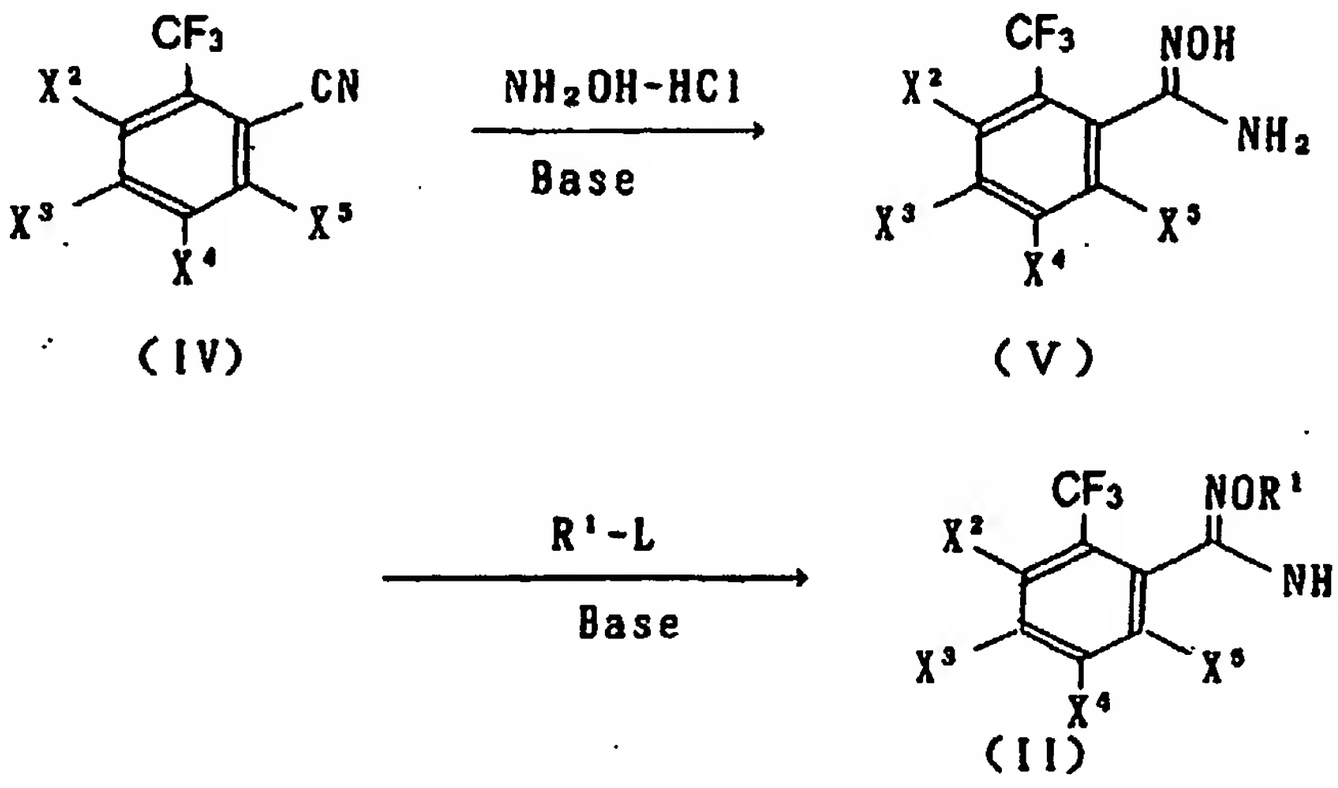
[0018] The reaction described above is carried out by reacting the compound represented by the general formula [II] and the compound represented by the general formula [III] in an organic solvent for from 10 min. to several dozens of hours at a temperature range of from 0°C to the boiling point of the solvent used and in the presence of a base, if appropriate.

[0019] For the examples of the solvent usable in the reaction described above, aromatic hydrocarbons, such as benzene and toluene, ethers, such as THF and diethyl ether, halogenated hydrocarbons. such as chloroform and dichloro methane, amides, such as DMF, DMSO, acetonitrile and the mixture of the solvent exemplified above, can be given.

[0020] As the base usable in the reaction, pyridine, triethyl amine, DBU, sodium hydroxide, sodium carbonate, potassium carbonate or the like can be exemplified.

[0021] After completed the reaction, the objective compounds can be obtained by taking an ordinary post-treatment procedure and allowing the products to the purification by using silica gel column chromatography or the else.

[0022] Whereas, the raw material compound of the present invention, represented by the general formula [II] can be synthesized according to the following reaction formula;



(IV) (V) (II)

wherein L is an eliminating group, such as paratoluenesulfonyloxy, methylsulfonyloxy and halogen atoms, and R^1, X^2, X^3, X^4 and X^5 are as described above.

[0023] The first step reaction in the reaction formula shown above is to obtain a benzamide oxime compound represented by the general formula [V], wherein a nitrile compound represented by the general formula [IV] and hydroxyl amine hydrochloride are allowed to a reaction for 10 min. to several dozens of hours in an inactive solvent and in the presence of a base at a temperature range of from 0 °C to the boiling point of the solvent used.

[0024] For the examples of the solvent usable in the reaction described above, alcohols, such as methanol, ethanol and propanol, ethers, such as THF and diethyl ether, amides, such as DMF, DMSO, water and the mixture of the solvent exemplified hereinabove, can be given.

[0025] Further, for the examples of the base usable in the reaction described above, sodium carbonate, sodium

hydrogencarbonate, potassium carbonate, sodium hydroxide, potassium hydroxide triethyl amine, pyridine and the like can be given.

[0026] The second step reaction in the reaction formula shown above is to obtain the raw material compound represented by the general formula [II]. wherein the compound represented by the general formula [V] and a compound represented by a general formula, R^1-L, are allowed to a reaction for 10 min. to several dozens of hours in a solvent and in the presence of a base at a temperature range of from -15 °C to the boiling point of the solvent used.

[0027] For the examples of the base usable in the second step reaction, metal alkoxide, such as sodium methoxide and sodium ethoxide. inorganic bases, such as sodium hydride, sodium hydroxide, potassium hydroxide and potassium carbonate. and organic bases, such as triethyl amine and pyridine, can be given.

[0028] Furthermore, if appropriate, catalysts may be used in the second step reaction, though it depends on the type of the solvent and the base to be used. For the examples of the catalysts usable in the reaction, crown ethers, such as 18-crown-6 and dicyclohexyl-18-crown-6, tetrabutyl ammonium bromide and other chlorides, quaternary ammonium salts, such as methyltrioctyl ammonium chloride and benzyltriethyl ammonium chloride, and phosphonium salts, such as tetraphenyl phosphonium bromide and hexadecyltributyl phosphonium iodide, can be given.

[0029] The chemical structures of the compounds of the present invention were determined by using NMR, IR, MS and the other analytical apparatuses.

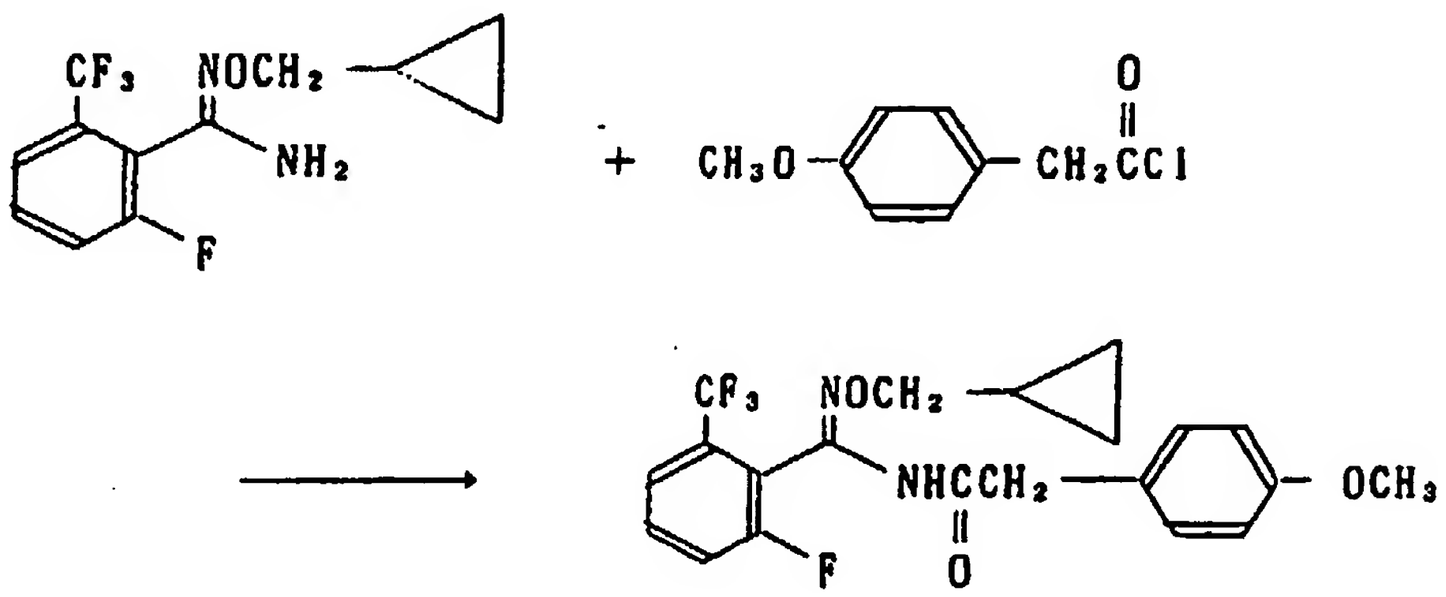
Best Mode for Carrying Out the Invention:

[0030] Now, the present invention is further described in detail with referring to the examples described hereinbelow.

Example 1

Preparation of N'-cyclopropylmethyloxy-N-(4-methoxyphenyl)acetyl-2-fluoro-6-trifluoromethylbenzamidine (Compound No. 56)

[0031]

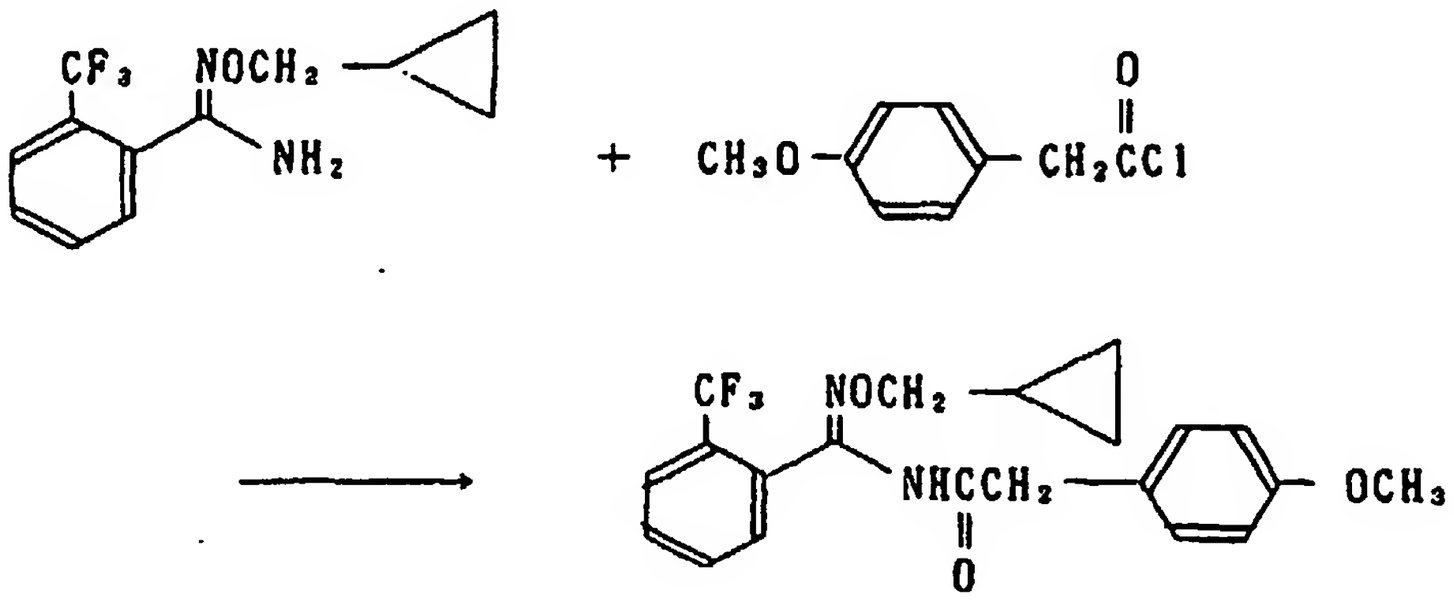


[0032] In 200ml of benzene was dissolved 20.0g of N'-cyclopropylmethyloxy-2-fluoro-6-trifluoromethylbenzamidine, and to the solution was added 16. 0g of 4-methoxyphenylacetylchloride. The solution was heated under refluxing for 10 hours. After cooling, ethyl acetate was added to the solution, followed by washing with water and drying over anhydrous magnesium sulfate. The organic layer was concentrated under reduced pressure and the residue was subjected to silica gel column chromatography to obtain 23.6g of the objective compound.m.p. 75-76°C

Example 2

Preparation N'-cyclopropylmethyloxy-N-(4-methoxyphenyl)acetyl-2-trifluoromethyl benzamidine (Compound No. 12)

[0033]



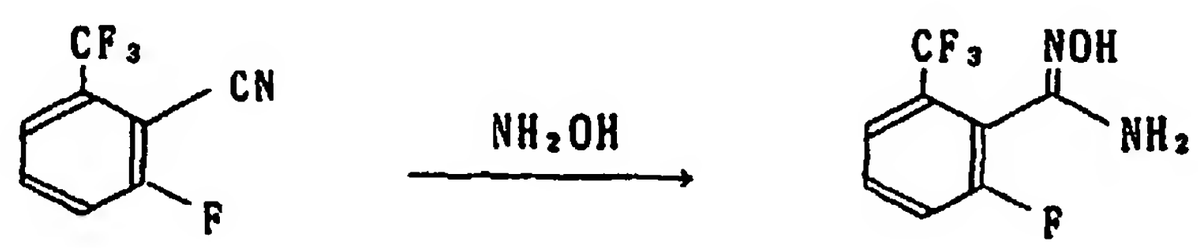
[0034] In 80ml of benzene was dissolved 10.4g of N'-cyclopropylmethyloxy-2-fluoro-6-trifluoromethylbenzamidine. and to the solution was added 8.9g of 4-methoxyphenylacetylchloride. The solution was heated under refluxing for 3 hours. After cooling, ethyl acetate was added to the solution, followed by washing with water and drying over anhydrous magnesium sulfate. The organic layer was concentrated under reduced pressure and the residue obtained in crystal was washed with a mixed solvent hexane and ether to thereby obtain 13.7g of crude crystal. The crystal was then re-crystallized in hexane. thereby affording 11.5g of the objective compound.m.p. 88-90 °C

[0035] Now, the examples for preparing the raw material compounds described above to be used for the preparing of the compounds of the present invention are described hereinbelow.

Reference Example 1

Preparation of 2-fluoro-6-trifluoromethylbenzamidoxime

[0036]



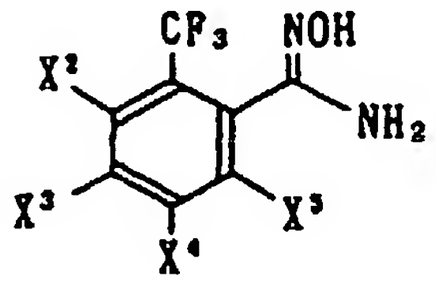
[0037] In 540ml of methanol was dissolved 58.8g of hydroxylamine hydrochloride and to the solution was added 160ml of aqueous solution of sodium carbonate containing 49.4g thereof. 40g of 2-fluoro-6-trifluoromethylbenzonitrile was added thereto at room temperature with stirring, and then further stirred 3 hours at 60°C. After removing the solvent methanol by distillation from the solution, the solution was extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate, and it was concentrated under reduced pressure, thereby obtaining crude crystals. The crystals were then added with 200ml of 3N aqueous solution of hydrochloric acid and thoroughly stirred, then the insoluble substance resulted in the solution was removed by filtration. The filtrate was then neutralized with 10% aqueous solution of sodium hydroxide under cooling and then extracted again with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate, and the solution was concentrated under reduced pressure to obtain 26.6g of the objective compound.
m.p. 155-157°C

[0038] The examples of benzamide oxime derivatives represented by the general formula [V], which can be manu-

factured according to the methods as described above, are given in Table 1 hereinbelow.

Table 1.

Chemical formula

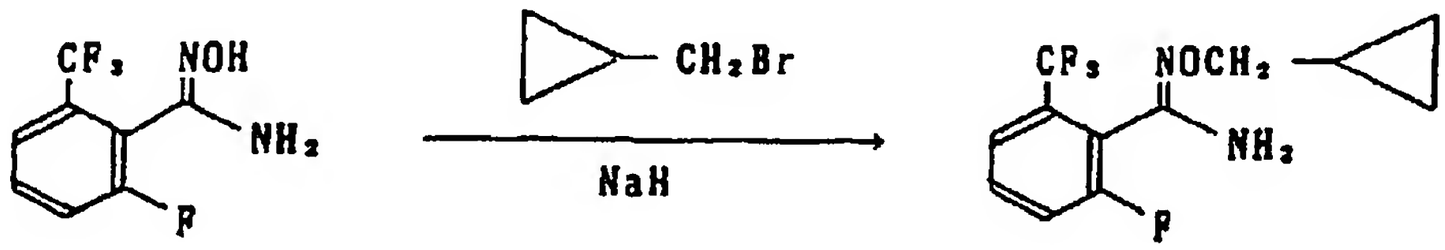


X^2	X^3	X^4	X^5	Physical const.
H	H	H	H	mp 124-126℃
H	H	H	Cl	mp 112-115℃
H	H	Cl	F	mp 107-108℃
H	H	Cl	Cl	$n_D^{24.0}$ 1.5210
H	H	H	F	mp 155-157℃
H	H	F	F	mp 105-107℃
H	H	F	Cl	mp 98- 99℃
H	H	CF_3	Cl	mp 97- 99℃

Reference Example 2

Preparation of N'-cyclopropylmethyloxy-2-fluoro-6-trifluoromethylbenzami dine

[0039]



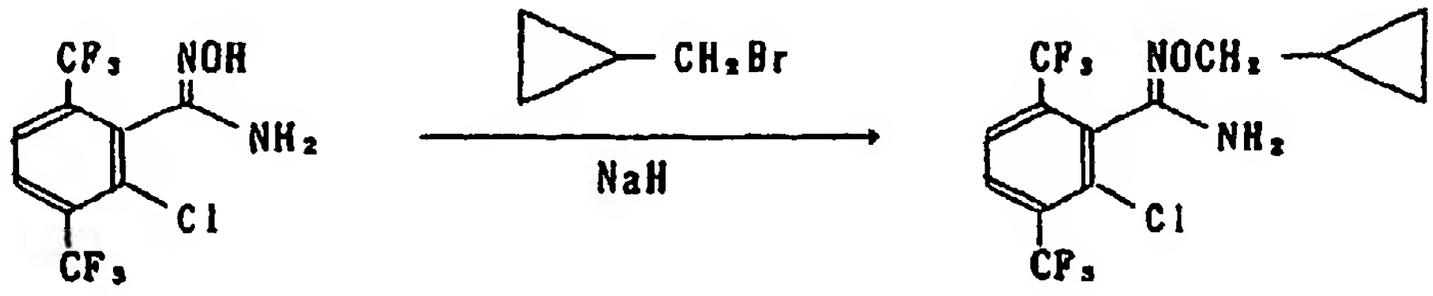
[0040] In 100ml of DMF was dissolved 26.6g of 2-fluoro-6-trifluoromethyl-benzamidoxime and 17.8g of cyclopropyl-methylbromide, and to the solution was added 4.8g of sodium hydride (60% in oil) at 10 °C over 30 min. The solution was then stirred for 3 hours, and the solution reacted was poured into ice-water and extracted with ethyl acetate. The organic layer was washed with water and dried over anhydrous magnesium sulfate. The organic layer was concentrated under reduced pressure and the residue was subjected to silica gel column chromatography to obtain 24.8g of the objective compound.
m.p. 63-64°C

Reference Examples 3

Preparation of N'-cyclopropylmethyloxy-3,6-bistrifluoromethyl-2-chloro-benzamidine

Preparation of N'-cyclopropylmethyloxy-3,6-bistrifluoromethyl-2-chloro benzamidine

[0041]

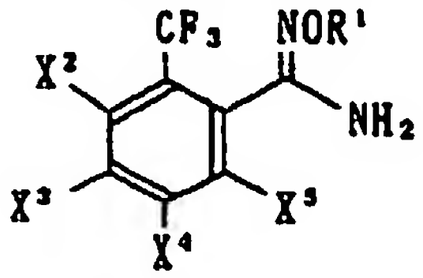


[0042] In 10ml of chloroform was dissolved 0.60g of 3,6-bistriftuoromethyl-2-chlorobenzamidoxime and 0.50g of cyclopropylmethylbromide, and to the solution was added 0.1g of tetrabutylammonium bromide at room temperature with stirring, and then 1.2ml of 10% aqueous solution of sodiumhydroxide, then stirred for 3 hours at 30-40°C. The solution was washed with water, washed with saturated saline solution and dried over anhydrous magnesium sulfate. The organic layer was concentrated under reduced pressure and the residue was subjected to silica gel column chromatography to obtain 0.40g of the objective compound.m.p. 75-80°C

[0043] The examples of benzamidoxime derivatives represented by the general formula [II], which can be prepared according to the methods similar to the methods as described above, are given in Table 2 hereinbelow.

Table 2.

Chemical formula



X^2	X^3	X^4	X^5	R^1	Physical const.
H	H	H	H	CH_2cPr	$n_D^{24.5}$ 1.4917
H	H	H	F	Et	mp 64-66℃
H	H	H	F	iPr	$n_D^{24.0}$ 1.4789
H	H	H	F	$CH_2C(CH_3)_3$	mp 97-98℃
H	H	H	F	$CH_2CH=CH_2$	mp 69-70℃
H	H	H	F	$CH_2C\equiv CH$	$n_D^{23.5}$ 1.5011
H	H	H	Cl	CH_2cPr	mp 43-46℃
H	H	Cl	F	CH_2cPr	mp 71-73℃
H	H	Cl	Cl	$CH_2C\equiv CH$	$n_D^{23.5}$ 1.5360
Cl	H	H	Cl	CH_2cPr	$n_D^{23.5}$ 1.5308
H	H	Cl	Cl	CH_2cPr	mp 73-75℃
H	H	F	F	CH_2cPr	mp 43-45℃
H	H	F	Cl	CH_2cPr	mp 54-55℃
H	H	CF_3	Cl	CH_2cPr	mp 75-78℃

*cPr represnts cyclopropylmethyl in the tables.

[0044] Now, the representative examples for the compounds of the present invention, which can be manufactured according to the praparation methods similar to the ones described in Examples 1 and 2, are given in Tables 3 and 4. However, it should be noted that X^1, X^2, X^3, X^4, X^5, R^1, R^2, r_1 and r_2 given in the Tables 3 and 4 correspond to X^1, X^2, X^3, X^4, X^5, R^1, R^2, r_1 and r_2 given for the compounds represented by the general formula [I], respectively.

Table 3.

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
1	CF_3	H	H	H	H	Et	Ph-4-OMe	72-73
2	CF_3	H	H	H	H	Me	Ph-4-OMe	
3	CF_3	H	H	H	H	CH_2cPr	2-thienyl	93-95
4	CF_3	H	H	H	H	CH_2cPr	3-thienyl	92-93
5	CF_3	H	H	H	H	CH_2cPr	Ph-2,4-F_2	100-101
6	CF_3	H	H	H	H	CH_2cPr	Ph-2-F	84-85
7	CF_3	H	H	H	H	CH_2cPr	Ph-2-F,4-OMe	84-85
8	CF_3	H	H	H	H	CH_2cPr	Ph-3-Me	81-82
9	CF_3	H	H	H	H	CH_2cPr	Ph-3-Me-4-OMe	77-79
10	CF_3	H	H	H	H	CH_2cPr	Ph-4-F	113-114
11	CF_3	H	H	H	H	CH_2cPr	Ph-4-Me	80-81
12	CF_3	H	H	H	H	CH_2cPr	Ph-4-OMe	88-90
13	CF_3	H	H	H	H	CH_2cPr	Ph	100-102
14	CF_3	H	H	H	H	nBu	Ph-4-OMe	
15	CF_3	H	H	H	H	tBu	Ph-4-OMe	
16	CF_3	H	H	H	F	$CH_2CH=CH_2$	Ph-4-OMe	$n_D^{27.0}$ 1.5290
17	CF_3	H	H	H	F	$CH_2CH=CH_2$	Ph	$n_D^{28.5}$ 1.5132
18	CF_3	H	H	H	F	$CH(CH_3)CH=CH_2$	Ph-4-OMe	76-78
19	CF_3	H	H	H	F	$CH_2CH=CHCl$	Ph-4-OMe	$n_D^{25.4}$ 1.5333
20	CF_3	H	H	H	F	$CH_2CH=CCl_2$	Ph-4-OMe	$n_D^{25.7}$ 1.5362
21	CF_3	H	H	H	F	$CH_2CH=CH-CH_3$	Ph-4-OMe	$n_D^{23.2}$ 1. 5148
22	CF_3	H	H	H	F	Et	Ph-4-OMe	70-73
23	CF_3	H	H	H	F	Et	Ph	59-61
24	CF_3	H	H	H	F	CH_2CH_2Cl	Ph-4-OMe	$n_D^{24.0}$ 1.5330
25	CF_3	H	H	H	F	CH_2CHF_2	Ph-4-OMe	78-80
26	CF_3	H	H	H	F	Me	Ph-4-OMe	
27	CF_3	H	H	H	F	$CH_2C(Cl)=CH_2$	Ph-4-OMe	$n_D^{25.5}$ 1.5242
28	CF_3	H	H	H	F	$CH_2C(CH_3)=CH_2$	Ph-4-OMe	$n_D^{25.0}$ 1.5162
29	CF_3	H	H	H	F	CH_2CN	Ph-4-OMe	$n_D^{25.5}$ 1.5113
30	CF_3	H	H	H	F	CH_2CN	Ph	$n_D^{23.5}$ 1. 5226
31	CF_3	H	H	H	F	CH_2OCH_3	Ph-4-OMe	$n_D^{24.0}$ 1.5288
32	CF_3	H	H	H	F	CH_2OCH_3	Ph	$n_D^{24.5}$ 1.5279
33	CF_3	H	H	H	F	CH_2cPr	3-methyl--pyrazol-1-yl	$n_D^{21.8}$ 1.5133
34	CF_3	H	H	H	F	CH_2cPr	4-methyl--pyrazol-1-yl	$n_D^{23.6}$ 1.5121
35	CF_3	H	H	H	F	CH_2cPr	pyrazol-1-yl	$n_D^{22.9}$ 1.5126
36	CF_3	H	H	H	F	CH_2cPr	3-methyl--2-thienyl	$n_D^{25.2}$ 1.5310
37	CF_3	H	H	H	F	CH_2cPr	4-methyl--2-thienyl	$n_D^{23.2}$ 1.5313

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
38	CF_3	H	H	H	F	CH_2cPr	5-methyl--2-thienyl	$n_D^{23.9}$ 1.5353
39	CF_3	H	H	H	F	CH_2cPr	2-thienyl	$n_D^{22.2}$ 1.5346
40	CF_3	H	H	H	F	CH_2cPr	4-methyl--3-thienyl	$n_D^{26.5}$ 1.5302
41	CF_3	H	H	H	F	CH_2cPr	5-methyl--3-thienyl	57-58
42	CF_3	H	H	H	F	CH_2cPr	3-thienyl	70-72
43	CF_3	H	H	H	F	CH_2cPr	Ph-2,4- F_2	$n_D^{26.0}$ 1.5083
44	CF_3	H	H	H	F	CH_2cPr	Ph-2-F	$n_D^{26.0}$ 1. 5191
45	CF_3	H	H	H	F	CH_2cPr	Ph-2-F-3-Me	$n_D^{25.4}$ 1.5197
46	CF_3	H	H	H	F	CH_2cPr	Ph-2-F-4-OMe	$n_D^{27.5}$ 1.5193
47	CF_3	H	H	H	F	CH_2cPr	Ph-2-F-4-OMe--5-Me	$n_D^{27.0}$ 1.6190
48	CF_3	H	H	H	F	CH_2cPr	Ph-2-F-5-Me	$n_D^{26.7}$ 1.5143
49	CF_3	H	H	H	F	CH_2cPr	Ph-3,5-Me_2	88-89
50	CF_3	H	H	H	F	CH_2cPr	Ph-3-Et	63-64
51	CF_3	H	H	H	F	CH_2cPr	Ph-3-Me	52-53
52	CF_3	H	H	H	F	CH_2cPr	Ph-3-Me-4-F	73-74
53	CF_3	H	H	H	F	CH_2cPr	Ph-3-Me-4-OMe	$n_D^{26.0}$ 1. 5307
54	CF_3	H	H	H	F	CH_2cPr	Ph-4-F	58-59
55	CF_3	H	H	H	F	CH_2cPr	Ph-4-Me	$n_D^{26.0}$ 1.5248
56	CF_3	H	H	H	F	CH_2cPr	Ph-4-OMe	75-76
57	CF_3	H	H	H	F	CH_2cPr	Ph	72-74
58	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	2-thienyl	54-56
59	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	3-thienyl	56-58
60	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph-2-F	57-58
61	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph-2-F-4-OMe	$n_D^{22.5}$ 1.5257
62	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph-2-F-5-Me	$n_D^{26.0}$ 1.5192
63	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph-3,5-Me_2	98-100
64	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph-4-Me	95-96
65	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph-4-OMe	$n_D^{27.5}$ 1.5370
66	CF_3	H	H	H	F	$CH_2C{\equiv}CH$	Ph	58-60
67	CF_3	H	H	H	F	$CH_2C{\equiv}Cl$	Ph-4-OMe	$n_D^{22.5}$ 1. 5557
68	CF_3	H	H	H	F	iPr	Ph-4-OMe	85-86
69	CF_3	H	H	H	F	iPr	Ph	84-85
70	CF_3	H	H	H	F	nBu	Ph	
71	CF_3	H	H	H	F	nPr	Ph-2-F-4-OMe	$n_D^{18.5}$ 1.5121
72	CF_3	H	H	H	F	nPr	Ph-2-F-5-Me	$n_D^{18.0}$ 1. 5129
73	CF_3	H	H	H	F	nPr	Ph-4-Me	59-60
74	CF_3	H	H	H	F	nPr	Ph-4-OMe	54-55
75	CF_3	H	H	H	F	nPr	Ph	$n_D^{26.5}$ 1. 5106
76	CF_3	H	H	H	F	tBu	Ph	
77	CF_3	H	H	H	Cl	$CH_2CH{=}CH_2$	Ph-4-OMe	
78	CF_3	H	H	H	Cl	$CH(CH_3)CH{=}CH_2$	Ph-4-OMe	
79	CF_3	H	H	H	Cl	$CH_2CH{=}CHCl$	Ph-4-OMe	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
80	CF_3	H	H	H	Cl	$CH_2CH=CCl_2$	Ph-4-OMe	
81	CF_3	H	H	H	Cl	$CH_2CH=CHCH_3$	Ph-4-OMe	
82	CF_3	H	H	H	Cl	Et	Ph-4-OMe	68-70
83	CF_3	H	H	H	Cl	CH_2CH_2Cl	Ph-4-OMe	
84	CF_3	H	H	H	Cl	CH_2CHF_2	Ph-4-OMe	
85	CF_3	H	H	H	Cl	Me	Ph-4-OMe	
86	CF_3	H	H	H	Cl	$CH_2C(Cl)=CH_2$	Ph-4-OMe	
87	CF_3	H	H	H	Cl	$CH_2C(CH_3)=CH_2$	Ph-4-OMe	
88	CF_3	H	H	H	Cl	CH_2CN	Ph-4-OMe	
89	CF_3	H	H	H	Cl	CH_2OMe	Pb-4-OMe	
90	CF_3	H	H	H	Cl	CH_2cPr	3-methyl--pyrazol-1-yl	
91	CF_3	H	H	H	Cl	CH_2cPr	4-methyl--pyrazol-1-yl	
92	CF_3	H	H	H	Cl	CH_2cPr	pyrazol-1-yl	
93	CF_3	H	H	H	Cl	CH_2cPr	3-methyl--2-thienyl	
94	CF_3	H	H	H	Cl	CH_2cPr	4-methyl--2-thienyl	
95	CF_3	H	H	H	Cl	CH_2cPr	5-methyl--2-thienyl	
96	CF_3	H	H	H	Cl	CH_2cPr	2-thienyl	47-49
97	CF_3	H	H	H	Cl	CH_2cPr	4-methyl--3-thienyl	
98	CF_3	H	H	H	Cl	CH_2cPr	5-methyl--3-thienyl	
99	CF_3	H	H	H	Cl	CH_2cPr	3-thienyl	74-76
100	CF_3	H	H	H	Cl	CH_2cPr	Ph-2,4-F_2	
101	CF_3	H	H	H	Cl	CH_2cPr	Ph-2-F	
102	CF_3	H	H	H	Cl	CH_2cPr	Ph-2-F-3-Me	
103	CF_3	H	H	H	Cl	CH_2cPr	Ph-2-F-4-OMe	
104	CF_3	H	H	H	Cl	CH_2cPr	Ph-2-F-4-OMe--5-Me	
105	CF_3	H	H	H	Cl	CH_2cPr	Ph-2-F-5-Me	$n_D^{23.8}$ 1.5323
106	CF_3	H	H	H	Cl	CH_2cPr	Ph-3,5-Me_2	
107	CF_3	H	H	H	Cl	CH_2cPr	Ph-3-Me	
108	CF_3	H	H	H	Cl	CH_2cPr	Ph-3-Me-4-F	
109	CF_3	H	H	H	Cl	CH_2cPr	Ph-3-Me-4-OMe	
110	CF_3	H	H	H	Cl	CH_2cPr	Ph-4-F	
111	CF_3	H	H	H	Cl	CH_2cPr	Ph-4-Me	
112	CF_3	H	H	H	Cl	CH_2cPr	Ph-4-OMe	65-67
113	CF_3	H	H	H	Cl	CH_2cPr	Ph	63-65
114	CF_3	H	H	H	Cl	$CH_2C\equiv CH$	Ph-4-OMe	76-78
115	CF_3	H	H	H	Cl	$CH_2C\equiv CH$	Ph	96-97
116	CF_3	H	H	H	Cl	$CH_2C\equiv Cl$	Ph-4-OMe	
117	CF_3	H	H	H	Cl	iPr	Ph-4-OMe	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
118	CF_3	H	H	H	Cl	nBu	Ph-4-OMe	
119	CF_3	H	H	H	Cl	nPr	Ph-4-OMe	
120	CF_3	H	H	H	Cl	tBu	Ph-4-OMe	
121	CF_3	H	H	H	CF_3	$CH_2CH=CH_2$	Ph-4-OMe	
122	CF_3	H	H	H	CF_3	$CH(CH_3)CH=CH_2$	Ph-4-OMe	
123	CF_3	H	H	H	CF_3	$CH_2CH=CHCl$	Ph-4-OMe	
124	CF_3	H	H	H	CF_3	$CH_2CH=CCl_2$	Ph-4-OMe	
125	CF_3	H	H	H	CF_3	$CH_2CH=CHCH_3$	Ph-4-OMe	
126	CF_3	H	H	H	CF_3	Et	Ph-4-OMe	
127	CF_3	H	H	H	CF_3	CH_2CH_2Cl	Ph-4-OMe	
128	CF_3	H	H	H	CF_3	CH_2CHF_2	Ph-4-OMe	
129	CF_3	H	H	H	CF_3	Me	Ph-4-OMe	
130	CF_3	H	H	H	CF_3	$CH_2C(Cl)=CH_2$	Ph-4-OMe	
131	CF_3	H	H	H	CF_3	$CH_2C(CH_3)=CH_2$	Ph-4-OMe	
132	CF_3	H	H	H	CF_3	CH_2CN	Ph-4-OMe	
133	CF_3	H	H	H	CF_3	CH_2OMe	Ph-4-OMe	
134	CF_3	H	H	H	CF_3	CH_2cPr	3-methyl--pyrazol-1-yl	
135	CF_3	H	H	H	CF_3	CH_2cPr	4-methyl-	
136	CF_3	H	H	H	CF_3	CH_2cPr	-pyrazol-1-yl Ph	
137	CF_3	H	H	H	CF_3	CH_2cPr	pyrazol-1-yl	
138	CF_3	H	H	H	CF_3	CH_2cPr	3-methyl--2-thienyl 4-methyl--2-thienyl	
139	CF_3	H	H	H	CF_3	CH_2cPr	5-methyl--2-thienyl	
140	CF_3	H	H	H	CF_3	CH_2cPr	2-thienyl	$n_D^{22.4}$ 1.5082
141	CF_3	H	H	H	CF_3	CH_2cPr	4-methyl--3-thienyl	
142	CF_3	H	H	H	CF_3	CH_2cPr	5-methyl--3-thienyl	
143	CF_3	H	H	H	CF_3	CH_2cPr	3-thienyl	
144	CF_3	H	H	H	CF_3	CH_2cPr	Ph-2,4-F_2	
145	CF_3	H	H	H	CF_3	CH_2cPr	Ph-2-F	
146	CF_3	H	H	H	CF_3	CH_2cPr	Ph-2-F-3-Me	
147	CF_3	H	H	H	CF_3	CH_2cPr	Ph-2-F-4-OMe	
148	CF_3	H	H	H	CF_3	CH_2cPr	Ph-2-P-4-OMe--5-Me	
149	CF_3	H	H	H	CF_3	CH_2cPr	Ph-2-F-5-Me	74 -75
150	CF_3	H	H	H	CF_3	CH_2cPr	Ph-3,5-Me_2	
151	CF_3	H	H	H	CF_3	CH_2cPr	Ph-3-Me	
152	CF_3	H	H	H	CF_3	CH_2cPr	Ph-3-Me-4-F	
153	CF_3	H	H	H	CF_3	CH_2cPr	Ph-3-Me-4-OMe	
154	CF_3	H	H	H	CF_3	CH_2cPr	Ph-4-F	
155	CF_3	H	H	H	CF_3	CH_2cPr	Ph-4-Me	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
156	CF_3	H	H	H	CF_3	CH_2cPr	Ph-4-OMe	$n_D^{22.6}$ 1.5031
157	CF_3	H	H	H	CF_3	CH_2cPr	Ph	68-69
158	CF_3	H	H	H	CF_3	$CH_2C{\equiv}CH$	Ph-4-OMe	
159	CF_3	H	H	H	CF_3	$CH_2C{\equiv}Cl$	Ph-4-OMe	
160	CF_3	H	H	H	CF_3	iPr	Ph-4-OMe	
161	CF_3	H	H	H	CF_3	nBu	Ph-4-OMe	
162	CF_3	H	H	H	CF_3	nPr	Ph-4-OMe	
163	CF_3	H	H	H	CF_3	tBu	Ph-4-OMe	
164	CF_3	H	H	H	OMe	$CH_2CH{=}CH_2$	Ph-4-OMe	
165	CF_3	H	H	H	OMe	$CH(CH_3)CH{=}CH_2$	Ph-4-OMe	
166	CF_3	H	H	H	OMe	$CH_2CH{=}CHCl$	Ph-4-OMe	
167	CF_3	H	H	H	OMe	$CH_2CH{=}CCl_2$	Ph-4-OMe	
168	CF_3	H	H	H	OMe	$CH_2CH{=}CHCH_3$	Ph-4-OMe	
169	CF_3	H	H	H	OMe	Et	Ph-4-OMe	95-96
170	CF_3	H	H	H	OMe	CH_2CH_2Cl	Ph-4-OMe	
171	CF_3	H	H	H	OMe	CH_2CHF_2	Ph-4-OMe	
172	CF_3	H	H	H	OMe	Me	Ph-4-OMe	
173	CF_3	H	H	H	OMe	$CH_2C(Cl){=}CH_2$	Ph-4-OMe	
174	CF_3	H	H	H	OMe	$CH_2C(CH_3){=}CH_2$	Ph-4-OMe	
175	CF_3	H	H	H	OMe	CH_2CN	Ph-4-OMe	
176	CF_3	H	H	H	OMe	CH_2OMe	Ph-4-OMe	
177	CF_3	H	H	H	OMe	CH_2cPr	3-methyl--pyrazol-1-yl	
178	CF_3	H	H	H	OMe	CH_2cPr	4-methyl--pyrazol-1-yl	
179	CF_3	H	H	H	OMe	CH_2cPr	pyrazol-1-yl	
180	CF_3	H	H	H	OMe	CH_2cPr	3-methyl--2-thienyl	
181	CF_3	H	H	H	OMe	CH_2cPr	4-methyl--2-thienyl	
182	CF_3	H	H	H	OMe	CH_2cPr	5-methyl--2-thienyl	
183	CF_3	H	H	H	OMe	CH_2cPr	2-thienyl	
184	CF_3	H	H	H	OMe	CH_2cPr	4-methyl--3-thienyl	
185	CF_3	H	H	H	OMe	CH_2cPr	5-methyl--3-thienyl	
186	CF_3	H	H	H	OMe	CH_2cPr	3-thienyl	
187	CF_3	H	H	H	OMe	CH_2cPr	Ph-2,4-F_2	
188	CF_3	H	H	H	OMe	CH_2cPr	Ph-2-F	
189	CF_3	H	H	H	OMe	CH_2cPr	Ph-2-F-3-Me	
190	CF_3	H	H	H	OMe	CH_2cPr	Ph-2-F-4-OMe	
191	CF_3	H	H	H	OMe	CH_2cPr	Ph-2-F-4-OMe--5-Me	
192	CF_3	H	H	H	OMe	CH_2cPr	Ph-2-F-5-Me	
193	CF_3	H	H	H	OMe	CH_2cPr	Ph-3,5-Me_2	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
194	CF_3	H	H	H	OMe	CH_2cPr	Ph-3-Me	
195	CF_3	H	H	H	OMe	CH_2cPr	Ph-3-Me-4-F	
196	CF_3	H	H	H	OMe	CH_2cPr	Ph-3-Me-4-OMe	
197	CF_3	H	H	H	OMe	CH_2cPr	Ph-4-F	
198	CF_3	H	H	H	OMe	CH_2cPr	Ph-4-Me	
199	CF_3	H	H	H	OMe	CH_2cPr	Ph-4-OMe	92-93
200	CF_3	H	H	H	OMe	CH_2cPr	Ph-3-Cl-4-OMe	
201	CF_3	H	H	H	OMe	CH_2cPr	Ph-3-Cl-4-OMe--5-Me	
202	CF_3	H	H	H	OMe	CH_2cPr	Ph	
203	CF_3	H	H	H	OMe	$CH_2C{\equiv}CH$	Ph-4-OMe	
204	CF_3	H	H	H	OMe	$CH_2C{\equiv}Cl$	Ph-4-OMe	
205	CF_3	H	H	H	OMe	iPr	Ph-4-OMe	
206	CF_3	H	H	H	OMe	nBu	Ph-4-OMe	
207	CF_3	H	H	H	OMe	nPr	Ph-4-OMe	
208	CF_3	H	H	H	OMe	tBu	Ph-4-OMe	
209	CF_3	H	H	H	SMe	Et	Ph-4-OMe	89-90
210	CF_3	H	H	H	SMe	Me	Ph-4-OMe	
211	CF_3	H	H	H	SMe	CH_2cPr	Ph-4-OMe	73-75
212	CF_3	H	H	H	SMe	CH_2cPr	Ph	106-109
213	CF_3	H	H	H	SMe	nBu	Ph-4-OMe	
214	CF_3	H	H	H	SMe	tBu	Ph-4-OMe	
215	CF_3	H	H	Cl	H	$CH_2CH{=}CH_2$	Ph-4-OMe	
216	CF_3	H	H	Cl	H	Et	Ph-4-OMe	
217	CF_3	H	H	Cl	H	Me	Ph-4-OMe	
218	CF_3	H	H	Cl	H	CH_2cPr	3-methyl--pyrazol-1-yl	
219	CF_3	H	H	Cl	H	CH_2cPr	4-methyl--pyrazol-1-yl	
220	CF_3	H	H	Cl	H	CH_2cPr	pyrazol-1-yl	
221	CF_3	H	H	Cl	H	CH_2cPr	3-methyl--2-thienyl	
222	CF_3	H	H	Cl	H	CH_2cPr	4-methyl--2-thienyl	
223	CF_3	H	H	Cl	H	CH_2cPr	5-methyl--2-thienyl	
224	CF_3	H	H	Cl	H	CH_2cPr	2-thienyl	
225	CF_3	H	H	Cl	H	CH_2cPr	4-methyl--3-thienyl	
226	CF_3	H	H	Cl	H	CH_2cPr	5-methyl--3-thienyl	
227	CF_3	H	H	Cl	H	CH_2cPr	3-thienyl	
228	CF_3	H	H	Cl	H	CH_2cPr	Ph-4-OMe	
229	CF_3	H	H	Cl	H	$CH_2C{\equiv}CH$	Ph-4-OMe	
230	CF_3	H	H	Cl	H	iPr	Ph-4-OMe	
231	CF_3	H	H	Cl	H	nBu	Ph-4-OMe	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
232	CF_3	H	H	Cl	H	nPr	Ph-4-OMe	
233	CF_3	H	H	Cl	H	tBu	Ph-4-OMe	
234	CF_3	H	H	Cl	F	$CH_2CH=CH_2$	Ph-4-OMe	81-83
235	CF_3	H	H	Cl	F	$CH(CH_3)CH=CH_2$	Ph-4-OMe	
236	CF_3	H	H	Cl	F	$CH_2CH=CHCl$	Ph-4-OMe	
237	CF_3	H	H	Cl	F	$CH_2CH=CCl_2$	Ph-4-OMe	
238	CF_3	H	H	Cl	F	$CH_2CH=CHCH_3$	Ph-4-OMe	
239	CF_3	H	H	Cl	F	Et	Ph-4-OMe	99- 100
240	CF_3	H	H	Cl	F	CH_2CH_2Cl	Ph-4-OMe	$n_D^{24.0}$ 1.5301
241	CF_3	H	H	Cl	F	CH_2CH_2Cl	Ph	90-91
242	CF_3	H	H	Cl	F	CH_2CH_2Cl	Ph-2-F-5-Me	$n_D^{24.0}$ 1.5241
243	CF_3	H	H	Cl	F	CH_2CHF_2	Ph-4-OMe	
244	CF_3	H	H	Cl	F	Me	Ph-4-OMe	
245	CF_3	H	H	Cl	F	$CH_2C(Cl)=CH_2$	Ph-4-OMe	
246	CF_3	H	H	Cl	F	$CH_2C(CH_3)=CH_2$	Ph-4-OMe	
247	CF_3	H	H	Cl	F	CH_2CN	Ph-4-OMe	
248	CF_3	H	H	Cl	F	CH_2OMe	Ph-4-OMe	
249	CF_3	H	H	Cl	F	CH_2cPr	3-methyl--pyrazol-1-yl	
250	CF_3	H	H	Cl	F	CH_2cPr	4-methyl--pyrazol-1-yl	
251	CF_3	H	H	Cl	F	CH_2cPr	pyrazol-1-yl	
252	CF_3	H	H	Cl	F	CH_2cPr	3-methyl--2-thienyl	
253	CF_3	H	H	Cl	F	CH_2cPr	4-methyl--2-thienyl	
254	CF_3	H	H	Cl	F	CH_2cPr	5-methyl--2-thienyl	
255	CF_3	H	H	Cl	F	CH_2cPr	2-thienyl	112-113
256	CF_3	H	H	Cl	F	CH_2cPr	4-methyl--3-thienyl	
257	CF_3	H	H	Cl	F	CH_2cPr	5-methyl--3-thienyl	
258	CF_3	H	H	Cl	F	CH_2cPr	3-thienyl	125-126
259	CF_3	H	H	Cl	F	CH_2cPr	Ph-2,4-F_2	
260	CF_3	H	H	Cl	F	CH_2cPr	Ph-2-F	57-59
261	CF_3	H	H	Cl	F	CH_2cPr	Ph-2-F-3-Me	
262	CF_3	H	H	Cl	F	CH_2cPr	Ph-2F-4-OMe	$n_D^{26.7}$ 1.5200
263	CF_3	H	H	Cl	F	CH_2cPr	Ph-2-F-4-OMe--5-Me	73-74
264	CF_3	H	H	Cl	F	CH_2cPr	Ph-2-F-5-Me	60-62
265	CF_3	H	H	Cl	F	CH_2cPr	Ph-3,5-Me_2	
266	CF_3	H	H	Cl	F	CH_2cPr	Ph-3-Me	92-93
267	CF_3	H	H	Cl	F	CH_2cPr	Ph-3-Me-4-F	98-99
268	CF_3	H	H	Cl	F	CH_2cPr	Ph-3-Me-4-OMe	86-87
269	CF_3	H	H	Cl	F	CH_2cPr	Ph-4-F	94-95

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
270	CF_3	H	H	Cl	F	CH_2cPr	Ph-4-Me	75-76
271	CF_3	H	H	Cl	F	CH_2cPr	Ph-4OMe	98
272	CF_3	H	H	Cl	F	CH_2cPr	Ph	112
273	CF_3	H	H	Cl	F	$CH_2C{\equiv}CH$	Ph	54-58
274	CF_3	H	H	Cl	F	$CH_2C{\equiv}CH$	Ph-2-F-5-Me	91-92
275	CF_3	H	H	Cl	F	$CH_2C{\equiv}CH$	Ph-4-OMe	102-103
276	CF_3	H	H	Cl	F	$CH_2C{\equiv}Cl$	Ph-4-OMe	112-114
277	CF_3	H	H	Cl	F	iPr	Ph-4-OMe	124-125
278	CF_3	H	H	Cl	F	nBu	Ph-4-OMe	
279	CF_3	H	H	Cl	F	nPr	Ph-4-OMe	90-91
280	CF_3	H	H	Cl	F	tBu	Ph-4-OMe	
281	CF_3	H	H	Cl	Cl	$CH_2CH{=}CH_2$	Ph-4-OMe	80-81
282	CF_3	H	H	Cl	Cl	$CH(CH_3)CH{=}CH_2$	Ph-4-OMe	
283	CF_3	H	H	Cl	Cl	$CH_2CH{=}CHCl$	Ph-4-OMe	
284	CF_3	H	H	Cl	Cl	$CH_2CH{=}CCl_2$	Ph-4-OMe	
285	CF_3	H	H	Cl	Cl	$CH_2CH{=}CHCH_3$	Ph-4-OMe	
286	CF_3	H	H	Cl	Cl	Et	Ph	123-124
287	CF_3	H	H	Cl	Cl	Et	Ph-2-F-5-Me	78-81
288	CF_3	H	H	Cl	Cl	Et	Ph-4-OMe	90-91
289	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	Ph	104-105
290	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	Ph-2-F-5-Me	$n_D^{26.5}$ 1.5309
291	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	Ph-4-OMe	
292	CF_3	H	H	Cl	Cl	CH_2CHF_2	Ph-4-OMe	
293	CF_3	H	H	Cl	Cl	Me	Ph-4-OMe	77-79
294	CF_3	H	H	Cl	Cl	$CH_2C(Cl){=}CH_2$	Ph-4-OMe	
295	CF_3	H	H	Cl	Cl	$CH_2C(CH_3){=}CH_2$	Ph-4-OMe	
296	CF_3	H	H	Cl	Cl	CH_2CN	Ph-4-OMe	
297	CF_3	H	H	Cl	Cl	CH_2OMe	Ph-4-OMe	
298	CF_3	H	H	Cl	Cl	CH_2cPr	3-methyl--pyrazol-1-yl	
299	CF_3	H	H	Cl	Cl	CH_2cPr	4-methyl--pyrazol-1-yl	
300	CF_3	H	H	Cl	Cl	CH_2cPr	pyrazol-1-yl	
301	CF_3	H	H	Cl	Cl	CH_2cPr	3-methyl--2-thienyl	
302	CF_3	H	H	Cl	Cl	CH_2cPr	4-methyl--2-thienyl	
303	CF_3	H	H	Cl	Cl	CH_2cPr	5-methyl--2-thienyl	
304	CF_3	H	H	Cl	Cl	CH_2cPr	2-thienyl	139-141
305	CF_3	H	H	Cl	Cl	CH_2cPr	4-methyl--3-thienyl	
306	CF_3	H	H	Cl	Cl	CH_2cPr	5-methyl--3-thienyl	
307	CF_3	H	H	Cl	Cl	CH_2cPr	3-thienyl	140-141
308	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-2,4-F_2	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
309	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-2-F	$n_D^{23.0}$ 1.5404
310	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-2-F-3-Me	
311	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-2-F-4-OMe	$n_D^{22.5}$ 1.5371
312	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-2F-4-OMe--5-Me	$n_D^{29.5}$ 1.5287
313	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-2-F-5-Me	56-57
314	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-3,5-Me_2	
315	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-3-Me	111-114
316	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-3-Me-4-F	113-114
317	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-3-Me-4-OMe	
318	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-4-F	
319	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-4-Me	93-95
320	CF_3	H	H	Cl	Cl	CH_2cPr	Ph-4-OMe	97-98
321	CF_3	H	H	Cl	Cl	CH_2cPr	Ph	134-135
322	CF_3	H	H	Cl	Cl	$CH_2C{\equiv}CH$	Ph	96-98
323	CF_3	H	H	Cl	Cl	$CH_2C{\equiv}CH$	Ph-2-F-5-Me	77-79
324	CF_3	H	H	C l	Cl	$CH_2C{\equiv}CH$	Ph-4-OMe	94-96
325	CF_3	H	H	Cl	Cl	$CH_2C{\equiv}Cl$	Ph-4-OMe	
326	CF_3	H	H	Cl	Cl	iPr	Ph-4-OMe	123-124
327	CF_3	H	H	Cl	Cl	nBu	Ph-4-OMe	
328	CF_3	H	H	Cl	Cl	nPr	Ph-4-OMe	88-89
329	CF_3	H	H	Cl	Cl	tBu	Ph-4-OMe	
330	CF_3	H	H	SMe	F	CH_2cPr	Ph-4-OMe	114-115
331	CF_3	H	H	OMe	F	CH_2cPr	Ph-4-OMe	125-126
332	CF_3	H	H	OMe	F	CH_2cPr	Ph-4-OMe	135-136
333	CF_3	H	H	Me	F	CH_2cPr	Ph-4-OMe	71-72
334	CF_3	H	F	H	H	Et	Ph-4-OMe	70-72
335	CF_3	H	F	H	H	Me	Ph-4-OMe	
336	CF_3	H	F	H	H	CH_2cPr	Ph-4-OMe	97-99
337	CF_3	H	F	H	H	CH_2cPr	Ph	117-119
338	CF_3	H	F	H	H	nBu	Ph-4-OMe	
339	CF_3	H	F	H	H	tBu	Ph	
340	CF_3	H	Cl	H	H	Et	Ph-4-OMe	89-91
341	CF_3	H	Cl	H	H	Me	Ph-4-OMe	
342	CF_3	H	Cl	H	H	CH_2cPr	Ph-4-OMe	97-99
343	CF_3	H	Cl	H	H	CH_2cPr	Ph	91-92
344	CF_3	H	Cl	H	H	nBu	Ph-4-OMe	
345	CF_3	H	Cl	H	H	tBu	Ph	
346	CF_3	Cl	H	H	F	CH_2cPr	Ph-4-OMe	Oil, ‡I
347	CF_3	Cl	H	H	Cl	CH_2cPr	2-thienyl	74
348	CF_3	Cl	H	H	Cl	CH_2cPr	Ph-4-OMe	100
349	CF_3	Cl	H	H	Cl	CH_2cPr	Ph	95-96
350	CF_3	H	H	F	F	$CH_2CH{=}CH_2$	Ph-4-OMe	
351	CF_3	H	H	F	F	Et	Ph	81-83
352	CF_3	H	H	F	F	Et	Ph-2-F-5-Me	79-80
353	CF_3	H	H	F	F	Et	Ph-4-OMe	78-79

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
354	CF_3	H	H	F	F	CH_2CH_2Cl	Ph	$n_D^{23.5}$ 1.5245
355	CF_3	H	H	F	F	CH_2CH_2Cl	Ph-2-F-5-Me	
356	CF_3	H	H	F	F	CH_2CH_2Cl	Ph-4-OMe	
357	CF_3	H	H	F	F	Me	Ph-4-OMe	
358	CF_3	H	H	F	F	CH_2OMe	Ph-4-OMe	
359	CF_3	H	H	F	P	CH_2cPr	3-methyl--pyrazol-1-yl	
360	CF_3	H	H	F	F	CH_2cPr	4-methyl--pyrazol-1-yl	
361	CF_3	H	H	F	F	CH_2cPr	pyrazol-1-yl	
362	CF_3	H	H	F	F	CH_2cPr	3-methyl--2-thienyl	
363	CF_3	H	H	F	F	CH_2cPr	4-methyl--2-thienyl	
364	CF_3	H	H	F	F	CH_2cPr	Ph-2-F	56-58
365	CF_3	H	H	F	F	CH_2cPr	Ph-2-F-3-Me	
366	CF_3	H	H	F	F	CH_2cPr	Ph-2F-4-OMe	
367	CF_3	H	H	F	F	CH_2cPr	Ph-2F-4-OMe--5-Me	70-73
368	CF_3	H	H	F	F	CH_2cPr	Ph-2F-5-Me	67-69
369	CF_3	H	H	F	F	CH_2cPr	Ph-3,5-Me_2	
370	CF_3	H	H	F	F	CH_2cPr	Ph-3-Me	70-72
371	CF_3	H	H	F	F	CH_2cPr	Ph-3-Me-4-F	51-53
372	CF_3	H	H	F	F	CH_2cPr	Ph-3-Me-4-OMe	56-57
373	CF_3	H	H	F	F	CH_2cPr	Ph-4-F	70-72
374	CF_3	H	H	F	F	CH_2cPr	Ph-4-Me	64-66
375	CF_3	H	H	F	F	CH_2cPr	Ph-4-OMe	73-74
376	CF_3	H	H	F	F	CH_2cPr	Ph	61-62
377	CF_3	H	H	F	F	$CH_2C{\equiv}CH$	Ph	76-78
378	CF_3	H	H	F	F	$CH_2C{\equiv}CH$	Ph-2-F-5-Me	84-86
379	CF_3	H	H	F	F	$CH_2C{\equiv}CH$	Ph-4-OMe	100-102
380	CF_3	H	H	F	F	$CH_2C{\equiv}Cl$	Ph-4-OMe	
381	CF_3	H	H	F	F	iPr	Ph-4-OMe	65-66
382	CF_3	H	H	F	F	nBu	Ph-4-OMe	
383	CF_3	H	H	F	F	nPr	Ph-4-OMe	67-69
384	CF_3	H	H	F	F	tBu	Ph-4-OMe	
385	CF_3	H	H	F	F	CH_2cPr	5-methyl--2-thienyl	
386	CF_3	H	H	F	F	CH_2cPr	2-thienyl	69-71
387	CF_3	H	H	F	F	CH_2cPr	4-methyl--3-thienyl	
388	CF_3	H	H	F	F	CH_2cPr	5-methyl--3-thienyl	
389	CF_3	H	H	F	F	CH_2cPr	3-thlenyl	79-81
390	CF_3	H	H	F	F	CH_2cPr	Ph-2,4-F_2	
391	CF_3	H	H	Cl	F	nPr	Ph	113-114
392	CF_3	H	H	Cl	F	nPr	Ph-2-F-5-Me	60-61

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
393	CF_3	H	H	Cl	F	iPr	Ph	111-112
394	CF_3	H	H	Cl	F	iPr	Ph-2-F-5-Me	
395	CF_3	H	H	Cl	F	$CH_2CH=CH_2$	Ph	107-108
396	CF_3	H	H	Cl	F	$CH_2CH=CH_2$	Ph-2-F-5-Me	68-70
397	CF_3	H	H	Cl	F	CH_3	Ph	
398	CF_3	H	H	Cl	F	CH_3	Ph-2-F-5-Me	
399	CF_3	H	H	Cl	F	$CH_2C=Cl$	Ph	90-91
400	CF_3	H	H	Cl	F	$CH_2C\equiv Cl$	Ph-2-F-5-Me	$n_D^{25.0}$ 1.5491
401	CF_3	H	H	Cl	F	CH_2CH_3	Ph	101-102
402	CF_3	H	H	Cl	F	CH_2CH_3	Ph-2-F-5-Me	60-62
403	CF_3	H	H	Cl	Cl	nPr	Ph	128-129
404	CF_3	H	H	Cl	Cl	nPr	Ph-2-F-5-Me	$n_D^{24.0}$ 1.5212
405	CF_3	H	H	Cl	Cl	iPr	Ph	125-127
406	CF_3	H	H	Cl	Cl	iPr	Ph-2-P-5-Me	$n_D^{24.7}$ 1.5245
407	CF_3	H	H	Cl	Cl	$CH_2CH=CH_2$	Ph	115-116
408	CF_3	H	H	Cl	Cl	$CH_2CH=CH_2$	Ph-2-F-5-Me	62-63
409	CF_3	H	H	Cl	Cl	CH_3	Ph	111-113
410	CF_3	H	H	Cl	Cl	CH_3	Ph-2-P-5-Me	80-81
411	CF_3	H	H	Cl	Cl	$CH_2C\equiv Cl$	Ph	
412	CF_3	H	H	Cl	Cl	$CH_2C\equiv Cl$	Ph-2-F-5-Me	
413	CF_3	H	H	F	F	nPr	Ph	56-58
414	CF_3	H	H	F	F	nPr	Ph-2-F-5-Me	38-40
415	CF_3	H	H	F	F	iPr	Ph	81-82.5
416	CF_3	H	H	F	F	iPr	Ph-2-F-5-Me	
417	CF_3	H	H	F	F	$CH_2CH=CH_2$	Ph	
418	CF_3	H	H	F	F	$CH_2CH=CH_2$	Ph-2-F-5-Me	
419	CF_3	H	H	F	F	CH_3	Ph	
420	CF_3	H	H	F	F	CH_3	Ph-2-F-5-Me	
421	CF_3	H	H	F	F	$CH_2C\equiv Cl$	Ph	
422	CF_3	H	H	F	F	$CH_2C\equiv Cl$	Ph-2-F-5-Me	
423	CF_3	H	H	F	Cl	$CH_2CH=CH_2$	Ph	
424	CF_3	H	H	F	Cl	$CH_2CH=CH_2$	Ph-4-OMe	
425	CF_3	H	H	F	Cl	$CH_2CH=CH_2$	Ph-2-F-5-Me	
426	CF_3	H	H	F	Cl	CH_2CH_3	Ph	
427	CF_3	H	H	F	Cl	CH_3CH_3	Ph-4-OMe	
428	CF_3	H	H	F	Cl	CH_2CH_3	Ph-2-F-5-Me	
429	CF_3	H	H	F	Cl	CH_2CH_2Cl	Ph	$n_D^{24.5}$ 1.5344
430	CF_3	H	H	F	Cl	CH_2CH_2Cl	Ph-4-OMe	$n_D^{24.5}$ 1.5294
431	CF_3	H	H	F	Cl	CH_2CH_2Cl	Ph-2-F-5-Me	
432	CF_3	H	H	F	Cl	CH_3	Ph	
433	CF_3	H	H	F	Cl	CH_3	Ph-4-OMe	
434	CF_3	H	H	F	Cl	CH_3	Ph-2-F-5-Me	
435	CF_3	H	H	F	Cl	CH_2OMe	Ph-4-OMe	
436	CF_3	H	H	F	Cl	CH_2cPr	3-methyl--pyrazol-1-yl	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
437	CF_3	H	H	F	Cl	CH_2cPr	4-methyl--pyrazol-1-yl	
438	CF_3	H	H	F	Cl	CH_2cPr	pyrazol-1-yl	
439	CF_3	H	H	F	Cl	CH_2cPr	3-methyl--2-thienyl	
440	CF_3	H	H	F	Cl	CH_2cPr	4-methyl--2-thienyl	
441	CF_3	H	H	F	Cl	CH_2cPr	5-methyl--2-thienyl	
442	CF_3	H	H	F	Cl	CH_2cPr	2-thienyl	104-106
443	CF_3	H	H	F	Cl	CH_2cPr	4-methyl--3-thienyl	
444	CF_3	H	H	F	Cl	CH_2cPr	5-methyl--3-thienyl	
445	CF_3	H	H	F	Cl	CH_2cPr	3-thienyl	113-115
446	CF_3	H	H	F	Cl	CH_2cPr	Ph-2,4-F_2	
447	CF_3	H	H	F	Cl	CH_2cPr	Ph-2-F	$n_D^{23.8}$ 1.5262
448	CF_3	H	H	F	Cl	CH_2cPr	Ph-2-F-3-Me	
449	CF_3	H	H	F	Cl	CH_2cPr	Ph-2-F-4-OMe	
450	CF_3	H	H	F	Cl	CH_2cPr	Ph-2-F-4-OMe--5-Me	
451	CF_3	H	H	F	Cl	CH_2cPr	Ph-2-F-5-Me	62-63
452	CF_3	H	H	F	Cl	CH_2cPr	Ph-3,5-Me_2	
453	CF_3	H	H	F	Cl	CH_2cPr	Ph-3-Me	96-98
454	CF_3	H	H	F	Cl	CH_2cPr	Ph-3-Me-4-F	82-83
455	CF_3	H	H	F	Cl	CH_2cPr	Ph-3-Me-4-OMe	72-73
456	CF_3	H	H	F	Cl	CH_2cPr	Ph-4-F	76-77
457	CF_3	H	H	F	Cl	CH_2cPr	Ph-4-Me	75-76
458	CF_3	H	H	F	Cl	CH_2cPr	Ph-4-OMe	68-69
459	CF_3	H	H	F	Cl	CH_2cPr	Ph	102-104
460	CF_3	H	H	F	Cl	$CH_2C\equiv CH$	Ph	
461	CF_3	H	H	F	Cl	$CH_2C\equiv CH$	Ph-4-OMe	
462	CF_3	H	H	F	Cl	$CH_2C\equiv CH$	Ph-2-F-5-Me	
463	CF_3	H	H	F	Cl	$CH_2C\equiv Cl$	Ph-4-OMe	
464	CF_3	H	H	F	Cl	iPr	Ph	
465	CF_3	H	H	F	Cl	iPr	Ph-4-OMe	
466	CF_3	H	H	F	Cl	iPr	Ph-2-F-5-Me	
467	CF_3	H	H	F	Cl	nPr	Ph	
468	CF_3	H	H	F	Cl	nPr	Ph-4-OMe	
469	CF_3	H	H	F	Cl	nPr	Ph-2-F-5-Me	
470	CF_3	H	H	F	Cl	nBu	Ph-4-OMe	
471	CF_3	H	H	F	Cl	tBu	Ph-4-OMe	
472	CF_3	H	H	CF_3	Cl	$CH_2CH=CH_2$	Ph	
473	CF_3	H	H	CF_3	Cl	$CH_2CH=CH_2$	Ph-4-OMe	
474	CF_3	H	H	CF_3	Cl	$CH_2CH=CH_2$	Ph-2-F-5-Me	
475	CF_3	H	H	CF_3	Cl	CH_2CH_3	Ph	
476	CF_3	H	H	CF_3	Cl	CH_2CH_3	Ph-4-OMe	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
477	CF_3	H	H	CF_3	Cl	CH_2CH_3	Ph-2-F-5-Me	
478	CF_3	H	H	CF_3	Cl	CH_2CH_2Cl	Ph	
479	CF_3	H	H	CF_3	Cl	CH_2CH_2Cl	Ph-4-OMe	
480	CF_3	H	H	CF_3	Cl	CH_2CH_2Cl	Ph-2-F-5-Me	
481	CF_3	H	H	CF_3	Cl	CH_3	Ph	
482	CF_3	H	H	CF_3	Cl	CH_3	Ph-4-OMe	
483	CF_3	H	H	CF_3	Cl	CH_3	Ph-2-F-5-Me	
484	CF_3	H	H	CF_3	Cl	CH_2OMe	Ph-4-OMe	
485	CF_3	H	H	CF_3	Cl	CH_2cPr	3-methyl--pyrazol-1-yl	
486	CF_3	H	H	CF_3	Cl	CH_2cPr	4-methyl--pyrazol-1-yl	
487	CF_3	H	H	CF_3	Cl	CH_2cPr	pyrazol-1-yl	
488	CF_3	H	H	CF_3	Cl	CH_2cPr	3-methyl--2-thienyl	
489	CF_3	H	H	CF_3	Cl	CH_2cPr	4-methyl--2-thienyl	
490	CF_3	H	H	CF_3	Cl	CH_2cPr	5-methyl--2-thienyl	
491	CF_3	H	H	CF_3	Cl	CH_2cPr	2-thienyl	
492	CF_3	H	H	CF_3	Cl	CH_2cPr	4-methyl--3-thienyl	
493	CF_3	H	H	CF_3	Cl	CH_2cPr	5-methyl--3-thienyl	
494	CF_3	H	H	CF_3	Cl	CH_2cPr	3-thienyl	
495	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-2,4-F_2	
496	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-2-F	
497	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-2-F-3-Me	
498	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-2-F-4-OMe	
499	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-2-F-4-OMe--5-Me	
500	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-2-F-5-Me	
501	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-3,5-Me_2	
502	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-3-Me	
503	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-3-Me-4-F	
504	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-3-Me-4-OMe	
505	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-4-F	
506	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-4-Me	
507	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph-4-OMe	
508	CF_3	H	H	CF_3	Cl	CH_2cPr	Ph	65-67
509	CF_3	H	H	CF_3	Cl	$CH_2C\equiv CH$	Ph	
510	CF_3	H	H	CF_3	Cl	$CH_2C\equiv CH$	Ph-4-OMe	
511	CF_3	H	H	CF_3	Cl	$CH_2C\equiv CH$	Ph-2-F-5-Me	
512	CF_3	H	H	CF_3	Cl	$CH_2C\equiv Cl$	Ph	
513	CF_3	H	H	CF_3	Cl	iPr	Ph	
514	CF_3	H	H	CF_3	Cl	IPr	Ph-4-OMe	
515	CF_3	H	H	CF_3	Cl	iPr	Ph-2-F-5-Me	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
516	CF_3	H	H	CF_3	Cl	nPr	Ph	
517	CF_3	H	H	CF_3	Cl	nPr	Ph-4-OMe	
518	CF_3	H	H	CF_3	Cl	nPr	Ph-2-F-5-Me	
519	CF_3	H	H	CF_3	Cl	nBu	Ph-4-OMe	
520	CF_3	H	H	CF_3	Cl	tBu	Ph-4-OMe	
521	CF_3	H	H	CF_3	F	$CH_2CH=CH_2$	Ph	
522	CF_3	H	H	CF_3	F	$CH_2CH=CH_2$	Ph-4-OMe	
523	CF_3	H	H	CF_3	F	$CH_2CH=CH_2$	Ph-2-F-5-Me	
524	CF_3	H	H	CF_3	F	CH_2CH_3	Ph	
525	CF_3	H	H	CF_3	F	CH_2CH_3	Ph-4-OMe	
526	CF_3	H	H	CF_3	F	CH_2CH_3	Ph-2-F-5-Me	
527	CF_3	H	H	CF_3	F	CH_2CH_2Cl	Ph	
528	CF_3	H	H	CF_3	F	CH_2CH_2Cl	Ph-4-OMe	
529	CF_3	H	H	CF_3	F	CH_2CH_2Cl	Ph-2-F-5-Me	
530	CF_3	H	H	CF_3	F	CH_3	Ph	
531	CF_3	H	H	CF_3	F	CH_3	Ph-4-OMe	
532	CF_3	H	H	CF_3	F	CH_3	Ph-2-F-5-Me	
533	CF_3	H	H	CF_3	F	CH_2OMe	Ph-4-OMe	
534	CF_3	H	H	CF_3	F	CH_2cPr	3-methyl--2-thienyl	
535	CF_3	H	H	CF_3	F	CH_2cPr	4-methyl--2-thienyl	
536	CF_3	H	H	CF_3	F	CH_2cPr	5-methyl--2-thienyl	
537	CF_3	H	H	CF_3	F	CH_2cPr	2-thienyl	
538	CF_3	H	H	CF_3	F	CH_2cPr	4-methyl--3-thienyl	
539	CF_3	H	H	CF_3	F	CH_2cPr	5-methyl--3-thienyl	
540	CF_3	H	H	CF_3	F	CH_2cPr	3-thienyl	
541	CF_3	H	H	CF_3	F	CH_2cPr	4-methyl--3-thienyl	
542	CF_3	H	H	CF_3	F	CH_2cPr	5-methyl--3-thienyl	
543	CF_3	H	H	CF_3	F	CH_2cPr	3-thienyl	
544	CF_3	H	H	CF_3	F	CH_2cPr	Ph-2,4-F_2	
545	CF_3	H	H	CF_3	F	CH_2cPr	Ph-2-F	
546	CF_3	H	H	CF_3	F	CH_2cPr	Ph-2-F-3-Me	
547	CF_3	H	H	CF_3	F	CH_2cPr	Ph-2-F-4-OMe	
548	CF_3	H	H	CF_3	F	CH_2cPr	Ph-2-F-4-OMe--5-Me	
549	CF_3	H	H	CF_3	F	CH_2cPr	Ph-2-F-5-Me	
550	CF_3	H	H	CF_3	F	CH_2cPr	Ph-3,5-Me_2	
551	CF_3	H	H	CF_3	F	CH_2cPr	Ph-3-Me	
552	CF_3	H	H	CF_3	F	CH_2cPr	Ph-3-Me-4-F	
553	CF_3	H	H	CF_3	F	CH_2cPr	Ph-3-Me-4-OMe	
554	CF_3	H	H	CF_3	F	CH_2cPr	Ph-4-F	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
555	CF_3	H	H	CF_3	F	CH_2cPr	Ph-4-Me	
556	CF_3	H	H	CF_3	F	CH_2cPr	Ph-4-OMe	
557	CF_3	H	H	CF_3	F	CH_2cPr	Ph	
558	CF_3	H	H	CF_3	F	$CH_2C{\equiv}CH$	Ph	
559	CF_3	H	H	CF_3	F	$CH_2C{\equiv}CH$	Ph-4-OMe	
560	CF_3	H	H	CF_3	F	$CH_2C{\equiv}CH$	Ph-2-F-5-Me	
561	CF_3	H	H	CF_3	F	$CH_2C{\equiv}Cl$	Ph-4-OMe	
562	CF_3	H	H	CF_3	F	iPr	Ph	
563	CF_3	H	H	CF_3	F	iPr	Ph-4-OMe	
564	CF_3	H	H	CF_3	F	iPr	Ph-2-F-5-Me	
565	CF_3	H	H	CF_3	F	nPr	Ph	
566	CF_3	H	H	CF_3	F	nPr	Ph-4-OMe	
567	CF_3	H	H	CF_3	F	nPr	Ph-2-F-5-Me	
568	CF_3	H	H	CF_3	F	nBu	Ph-4-OMe	
569	CF_3	H	H	CF_3	F	tBu	Ph-4-OMe	
570	CF_3	F	H	H	Cl	CH_2cPr	Ph	
571	CF_3	F	H	H	Cl	CH_2cPr	Ph-4-OMe	
572	CF_3	F	H	H	Cl	CH_2cPr	Ph-2-F-5-Me	
573	CF_3	F	H	H	F	CH_2cPr	Ph	
574	CF_3	F	H	H	F	CH_2cPr	Ph-4-OMe	
575	CF_3	F	H	H	F	CH_2cPr	Ph-2-F-5-Me	
576	CF_3	CF_3	H	H	Cl	CH_2cPr	Ph	
577	CF_3	CF_3	H	H	Cl	CH_2cPr	Ph-4-OMe	
578	CF_3	CF_3	H	H	Cl	CH_2cPr	Ph-2-F-5-Me	
579	CF_3	CF_3	H	H	F	CH_2cPr	Ph	
580	CF_3	CF_3	H	H	F	CH_2cPr	Ph-4-OMe	
581	CF_3	CF_3	H	H	F	CH_2cPr	Ph-2-F-5-Me	
582	CF_3	Cl	H	H	CF_3	CH_2cPr	Ph	
583	CF_3	Cl	H	H	CF_3	CH_2cPr	Ph-4-OMe	
584	CF_3	Cl	H	H	CF_3	CH_2cPr	Ph-2-F-5-Me	
585	CF_3	F	H	H	CF_3	CH_2cPr	Ph	
586	CF_3	F	H	H	CF_3	CH_2cPr	Ph-4-OMe	
587	CF_3	F	H	H	CF_3	CH_2cPr	Ph-2-F-5-Me	
588	CF_3	CF_3	H	H	CF_3	CH_2cPr	Ph	
589	CF_3	CF_3	H	H	CF_3	CH_2cPr	Ph-4-OMe	
590	CF_3	CF_3	H	H	CF_3	CH_2cPr	Ph-2-F-5-Me	
591	CF_3	H	H	H	CH_3	CH_2cPr	Ph	
592	CF_3	H	H	H	CH_3	CH_2cPr	Ph-4-OMe	
593	CF_3	H	H	H	CH_3	CH_2cPr	Ph-2-F-5-Me	
594	CF_3	H	H	F	CH_3	CH_2cPr	Ph	
595	CF_3	H	H	F	CH_3	CH_2cPr	Ph-4-OMe	
596	CF_3	H	H	F	CH_3	CH_2cPr	Ph-2-F-5-Me	
597	CF_3	H	H	Cl	CH_3	CH_2cPr	Ph	
598	CF_3	H	H	Cl	CH_3	CH_2cPr	Ph-4-OMe	
599	CF_3	H	H	Cl	CH_3	CH_2cPr	Ph-2-F-5-Me	
600	CF_3	F	H	F	F	CH_2cPr	Ph	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
601	CF_3	F	H	F	F	CH_2cPr	Ph-4-OMe	
602	CF_3	F	H	F	F	CH_2cPr	Ph-2-F-5-Me	
603	CF_3	F	H	F	Cl	CH_2cPr	Ph	
604	CF_3	F	H	F	Cl	CH_2cPr	Ph-4-OMe	
605	CF_3	F	H	F	Cl	CH_2cPr	Ph-2-F-5-Me	
606	CF_3	F	H	Cl	F	CH_2cPr	Ph	
607	CF_3	F	H	Cl	F	CH_2cPr	Ph-4-OMe	
608	CF_3	F	H	Cl	F	CH_2cPr	Ph-2-F-5-Me	
609	CF_3	F	H	Cl	Cl	CH_2cPr	Ph	
610	CF_3	F	H	Cl	Cl	CH_2cPr	Ph-4-OMe	
611	CF_3	F	H	Cl	Cl	CH_2cPr	Ph-2-F-5-Me	
612	CF_3	Cl	H	F	F	CH_2cPr	Ph	
613	CF_3	Cl	H	F	F	CH_2cPr	Ph-4-OMe	
614	CF_3	Cl	H	F	F	CH_2cPr	Ph-2-F-5-Me	
615	CF_3	Cl	H	F	Cl	CH_2cPr	Ph	
616	CF_3	Cl	H	F	Cl	CH_2cPr	Ph-4-OMe	
617	CF_3	Cl	H	F	Cl	CH_2cPr	Ph-2-F-5-Me	
618	CF_3	Cl	H	Cl	F	CH_2cPr	Ph	
619	CF_3	Cl	H	Cl	F	CH_2cPr	Ph-4-OMe	
620	CF_3	Cl	H	Cl	F	CH_2cPr	Ph-2-F-5-Me	
621	CF_3	Cl	H	Cl	Cl	CH_2cPr	Ph	
622	CF_3	Cl	H	Cl	Cl	CH_2cPr	Ph-4-OMe	
623	CF_3	Cl	H	Cl	Cl	CH_2cPr	Ph-2-F-5-Me	
624	CF_3	Cl	H	Cl	CF_3	CH_2cPr	Ph	
625	CF_3	Cl	H	F	CF_3	CH_2cPr	Ph	
626	CF_3	F	H	Cl	CF_3	CH_2cPr	Ph	
627	CF_3	F	H	F	CF_3	CH_2cPr	Ph	
628	CF_3	CF_3	H	Cl	Cl	CH_2cPr	Ph	
629	CF_3	CF_3	H	Cl	P	CH_2cPr	Ph	
630	CF_3	CF_3	H	F	Cl	CH_2cPr	Ph	
631	CF_3	CF_3	H	F	F	CH_2cPr	Ph	
632	CF_3	Cl	H	CF_3	Cl	CH_2cPr	Ph	
633	CF_3	F	H	CF_3	Cl	CH_2cPr	Ph	
634	CF_3	Cl	H	CF_3	F	CH_2cPr	Ph	
635	CF_3	F	H	CF_3	F	CH_2cPr	Ph	
636	CF_3	CF_3	H	Cl	CF_3	CH_2cPr	Ph	
637	CF_3	CF_3	H	F	CF_3	CH_2cPr	Ph	
638	CF_3	CF_3	H	CF_3	CF_3	CH_2cPr	Ph	
639	CF_3	F	F	F	F	CH_2cPr	Ph	
640	CF_3	F	F	F	Cl	CH_2cPr	Ph	
641	CF_3	F	F	Cl	F	CH_2cPr	Ph	
642	CF_3	F	F	Cl	Cl	CH_2cPr	Ph	
643	CF_3	Cl	H	Cl	CF_3	CH_2cPr	Ph-4-OMe	
644	CF_3	Cl	H	F	CF_3	CH_2cPr	Ph-4-OMe	
645	CF_3	F	H	Cl	CF_3	CH_2cPr	Ph-4-OMe	
646	CF_3	F	H	F	CF_3	CH_2cPr	Ph-4-OMe	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
647	CF_3	CF_3	H	Cl	Cl	CH_2cPr	Ph-4-OMe	
648	CF_3	CF_3	H	Cl	F	CH_2cPr	Ph-4-OMe	
649	CF_3	CF_3	H	F	Cl	CH_2cPr	Ph-4-OMe	
650	CF_3	CF_3	H	F	F	CH_2cPr	Ph-4-OMe	
651	CF_3	Cl	H	CF_3	Cl	CH_2cPr	Ph-4-OMe	
652	CF_3	F	H	CF_3	Cl	CH_2cPr	Ph-4-OMe	
653	CF_3	Cl	H	CF_3	F	CH_2cPr	Ph-4-OMe	
654	CF_3	F	H	CF_3	F	CH_2cPr	Ph-4-OMe	
655	CF_3	CF_3	H	Cl	CF_3	CH_2cPr	Ph-4-OMe	
656	CF_3	CF_3	H	F	CF_3	CH_2cPr	Ph-4-OMe	
657	CF_3	CF_3	H	CF_3	CF_3	CH_2cPr	Ph-4-OMe	
658	CF_3	F	F	F	F	CH_2cPr	Ph-4-OMe	
659	CF_3	F	F	F	Cl	CH_2cPr	Ph-4-OMe	
660	CF_3	F	F	Cl	F	CH_2cPr	Ph-4-OMe	
661	CF_3	F	F	Cl	Cl	CH_2cPr	Ph-4-OMe	
662	CF_3	H	H	H	F	CH_2-1-F-cPr	Ph	
663	CF_3	H	H	H	F	CH_2-2-F-cPr	Ph	
664	CF_3	H	H	H	F	CH_2-2-F_2-cPr	Ph	
665	CF_3	H	H	H	F	CH_2-1-F-cPr	Ph-4-OMe	
666	CF_3	H	H	H	F	CH_2-2-F-cPr	Ph-4-OMe	
667	CF_3	H	H	H	F	CH_2-2-F_2-cPr	Ph-4-OMe	
668	CF_3	H	H	Cl	Cl	CH_2-1-F-cPr	Ph	
669	CF_3	H	H	Cl	Cl	CH_2-2-F-cPr	Ph	
670	CF_3	H	H	Cl	Cl	CH_2-2-F_2-cPr	Ph	
671	CF_3	H	H	Cl	Cl	CH_2-1-F-cPr	Ph-4-OMe	
672	CF_3	H	H	Cl	Cl	CH_2-2-F-cPr	Ph-4-OMe	
673	CF_3	H	H	Cl	Cl	CH_2-2-F_2-cPr	Ph-4-OMe	
674	CF_3	H	H	Cl	F	CH_2-1-F-cPr	Ph	
675	CF_3	H	H	Cl	F	CH_2-2-F-cPr	Ph	
676	CF_3	H	H	Cl	F	CH_2-2-F_2-cPr	Ph	
677	CF_3	H	H	Cl	F	CH_2-1-F-cPr	Ph-4-OMe	
678	CF_3	H	H	Cl	F	CH_2-2-F-cPr	Ph-4-OMe	
679	CF_3	H	H	Cl	F	CH_2-2-F_2-cPr	Ph-4-OMe	
680	CF_3	H	H	F	Cl	CH_2-1-F-cPr	Ph	
681	CF_3	H	H	F	Cl	CH_2-2-F-cPr	Ph	
682	CF_3	H	H	F	Cl	CH_2-2-F_2-cPr	Ph	
683	CF_3	H	H	F	Cl	CH_2-1-F-cPr	Ph-4-OMe	
684	CF_3	H	H	F	Cl	CH_2-2-F-cPr	Ph-4-OMe	
685	CF_3	H	H	F	Cl	CH_2-2-F_2-cPr	Ph-4-OMe	
686	CF_3	H	H	F	F	CH_2-1-F-cPr	Ph	
687	CF_3	H	H	F	F	CH_2-2-F-cPr	Ph	
688	CF_3	H	H	F	F	CH_2-2-F_2-cPr	Ph	
689	CF_3	H	H	F	F	CH_2-1-F-cPr	Ph-4-OMe	
690	CF_3	H	H	F	F	CH_2-2-F-cPr	Ph-4-OMe	
691	CF_3	H	H	F	F	CH_2-2-F_2-cPr	Ph-4-OMe	
692	CF_3	H	H	H	Br	CH_2CH_3	Ph	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
693	CF_3	H	H	H	Br	CH_2CH_3	Ph-4-OMe	
694	CF_3	H	H	H	Br	CH_2-cPr	Ph	$n_D^{23.5}$ 1.5343
695	CF_3	H	H	H	Br	CH_2-cPr	Ph-4-OMe	$n_D^{29.5}$ 1.5330
696	CF_3	H	H	H	Br	CH_2-cPr	Ph-2-F-5-Me	
697	CF_3	H	H	F	Br	CH_2CH_3	Ph	
698	CF_3	H	H	F	Br	CH_2CH_3	Ph-4-OMe	
699	CF_3	H	H	F	Br	CH_2-cPr	Ph	114-115
700	CF_3	H	H	F	Br	CH_2-cPr	Ph-4-OMe	$n_D^{23.1}$ 1.5304
701	CF_3	H	H	F	Br	CH_2-cPr	Ph-4-F	81-82
702	CF_3	H	H	Cl	Br	CH_2CH_3	Ph	
703	CF_3	H	H	Cl	Br	CH_2CH_3	Ph-4-OMe	
704	CF_3	H	H	Cl	Br	CH_2-cPr	Ph	
705	CF_3	H	H	Cl	Br	CH_2-cPr	Ph-4-OMe	
706	CF_3	H	H	Cl	Br	CH_2-cPr	Ph-2-F-5-Me	
707	CF_3	H	H	Br	F	CH_2CH_3	Ph	
708	CF_3	H	H	Br	F	CH_2CH_3	Ph-4-OMe	
709	CF_3	H	H	Br	F	CH_2-cPr	Ph	
710	CF_3	H	H	Br	F	CH_2-cPr	Ph-4-OMe	
711	CF_3	H	H	Br	F	CH_2-cPr	Ph-2-F-5-Me	
712	CF_3	H	H	Br	Cl	CH_2CH_3	Ph	
713	CF_3	H	H	Br	Cl	CH_2CH_3	Ph-4-OMe	
714	CF_3	H	H	Br	Cl	CH_2-cPr	Ph	
715	CF_3	H	H	Br	Cl	CH_2-cPr	Ph-4-OMe	
716	CF_3	H	H	Br	Cl	CH_2-cPr	Ph-2-F-5-Me	
717	CF_3	H	H	F	H	CH_2CH_3	Ph	
718	CF_3	H	H	F	H	CH_2CH_3	Ph-4-OMe	
719	CF_3	H	H	F	H	CH_2-cPr	Ph	91-92
720	CF_3	H	H	F	H	CH_2-cPr	Ph-4-OMe	109-110
721	CF_3	H	H	F	H	CH_2-cPr	Ph-2-F-5-Me	
722	CF_3	H	H	Cl	H	CH_2CH_3	Ph	
723	CF_3	H	H	F	H	CH_2-cPr	Ph-2-F	94-95
724	CF_3	H	H	Cl	H	CH_2-cPr	Ph	99-100
725	CF_3	H	H	F	H	CH_2-cPr	Ph-4-F	110-111
726	CF_3	H	H	Cl	H	CH_2-cPr	Ph-2-F-5-Me	
727	CF_3	H	H	H	I	CH_2CH_3	Ph	
728	CF_3	H	H	H	I	CH_2CH_3	Ph-4-OMe	
729	CF_3	H	H	H	I	CH_2-cPr	Ph	
730	CF_3	H	H	H	I	CH_2-cPr	Ph-4-OMe	
731	CF_3	H	H	H	I	CH_2-cPr	Ph-2-F-5-Me	
732	CF_3	H	H	Cl	Cl	CH_2-cHxe-3	Ph	106-107
733	CF_3	H	H	Cl	Cl	CH_2-cHex--3,4-Br_2	Ph	124-125
734	CP_3	H	H	Cl	Cl	CH_2-cHex	Ph	106-109
735	C_2F_5	H	H	F	F	CH_2-cPr	Ph	
736	C_2F_5	H	H	F	F	CH_2-cPr	Ph-4-OMe	
737	C_2F_5	H	H	F	F	CH_2-cPr	Ph-2-F-5-Me	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
738	C_2F_5	H	H	F	F	CH_2CH_2Cl	Ph	
739	C_2F_5	H	H	F	F	CH_2CH_3	Ph	
740	C_2F_5	H	H	F	F	$CH_2C{\equiv}CH$	Ph	
741	C_2F_5	H	H	Cl	Cl	CH_2-cPr	Ph	
742	C_2F_5	H	H	Cl	Cl	CH_2-cPr	Ph-4-OMe	
743	C_2F_5	H	H	Cl	Cl	CH_2-cPr	Ph-2-F-5-Me	
744	C_2F_5	H	H	Cl	Cl	CH_2CH_2Cl	Ph	
745	C_2F_5	H	H	Cl	Cl	CH_2CH_3	Ph	
746	C_2F_5	H	H	Cl	Cl	$CH_2C{\equiv}CH$	Ph	
747	C_2F_5	H	H	F	Cl	CH_2-cPr	Ph	
748	C_2F_5	H	H	F	Cl	CH_2-cPr	Ph-4-OMe	
749	C_2F_5	H	H	F	Cl	CH_2-cPr	Ph-2-F-5-Me	
750	C_2F_5	H	H	F	Cl	CH_2CH_2Cl	Ph	
751	C_2F_5	H	H	F	Cl	CH_2CH_3	Ph	
752	C_2F_5	H	H	F	Cl	$CH_2C{\equiv}CH$	Ph	
753	C_2F_5	H	H	Cl	F	CH_2-cPr	Ph	
754	C_2F_5	H	H	Cl	F	CH_2-cPr	Ph-4-OMe	
755	C_2F_5	H	H	Cl	F	CH_2-cPr	Ph-2-P-5-Me	
756	C_2F_5	H	H	Cl	F	CH_2CH_2Cl	Ph	
757	C_2F_5	H	H	Cl	F	CH_2CH_3	Ph	
758	C_2F_5	H	H	Cl	F	$CH_2C{\equiv}CH$	Ph	
759	CCl_3	H	H	F	F	CH_2-cPr	Ph	
760	CCl_3	H	H	F	F	CH_2-cPr	Ph-4-OMe	
761	CCl_3	H	H	F	F	CH_2-cPr	Ph-2-F-5-Me	
762	CCl_3	H	H	F	F	CH_2CH_2Cl	Ph	
763	CCl_3	H	H	F	F	CH_2CH_3	Ph	
764	CCl_3	H	H	F	F	$CH_2C{\equiv}CH$	Ph	
765	CCl_3	H	H	Cl	Cl	CH_2-cPr	Ph	
766	CCl_3	H	H	Cl	Cl	CH_2-cPr	Ph-4-OMe	
767	CCl_3	H	H	Cl	Cl	CH_2-cPr	Ph-2-F-5-Me	
768	CCl_3	H	H	Cl	Cl	CH_2CH_2Cl	Ph	
769	CCl_3	H	H	Cl	Cl	CH_2CH_3	Ph	
770	CCl_3	H	H	Cl	Cl	$CH_2C{\equiv}CH$	Ph	
771	CCl_3	H	H	F	Cl	CH_2-cPr	Ph	
772	CCl_3	H	H	F	Cl	CH_2-cPr	Ph-4-OMe	
773	CCl_3	H	H	F	Cl	CH_2-cPr	Ph-2-F-5-Me	
774	CCl_3	H	H	F	Cl	CH_2CH_2Cl	Ph	
775	CCl_3	H	H	F	Cl	CH_2CH_3	Ph	
776	CCl_3	H	H	F	Cl	$CH_2C{\equiv}CH$	Ph	
777	CCl_3	H	H	Cl	F	CH_2-cPr	Ph	
778	CCl_3	H	H	Cl	F	CH_2-cPr	Ph-4-OMe	
779	CCl_3	H	H	Cl	F	CH_2-cPr	Ph-2-F-5-Me	
780	CCl_3	H	H	Cl	F	CH_2CH_2Cl	Ph	
781	CCl_3	H	H	Cl	F	CH_2CH_3	Ph	
782	CCl_3	H	H	Cl	F	$CH_2C{\equiv}CH$	Ph	
783	CHF_2	H	H	F	F	CH_2cPr	Ph	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
784	CHF_2	H	H	F	F	CH_2cPr	Ph-4-OMe	
785	CHF_2	H	H	F	F	CH_2cPr	Ph-2-F-5-Me	
786	CHF_2	H	H	F	F	CH_2CH_2Cl	Ph	
787	CHF_2	H	H	F	F	CH_2CH_3	Ph	
788	CHF_2	H	H	F	F	$CH_2C{\equiv}CH$	Ph	
789	CHF_2	H	H	Cl	Cl	CH_2cPr	Ph	
790	CHF_2	H	H	Cl	Cl	CH_2cPr	Ph-4-OMe	
791	CHF_2	H	H	Cl	Cl	CH_2cPr	Ph-2-F-5-Me	
792	CHF_2	H	H	Cl	Cl	CH_2CH_2Cl	Ph	
793	CHF_2	H	H	Cl	Cl	CH_2CH_3	Ph	
794	CHF_2	H	H	Cl	Cl	$CH_2C{\equiv}CH$	Ph	
795	CHF_2	H	H	F	Cl	CH_2cPr	Ph	
796	CHF_2	H	H	F	Cl	CH_2cPr	Ph-4-OMe	
797	CHF_2	H	H	F	Cl	CH_2cPr	Ph-2-F-5-Me	
798	CHF_2	H	H	F	Cl	CH_2CH_2Cl	Ph	
799	CHF_2	H	H	F	Cl	CH_2CH_3	Ph	
800	CHF_2	H	H	F	Cl	$CH_2C{\equiv}CH$	Ph	
801	CHF_2	H	H	Cl	F	CH_2cPr	Ph	
802	CHF_2	H	H	Cl	F	CH_2cPr	Ph-4-OMe	
803	CHF_2	H	H	Cl	F	CH_2cPr	Ph-2-F-5-Me	
804	CHF_2	H	H	Cl	F	CH_2CH_2Cl	Ph	
805	CHF_2	H	H	Cl	F	CH_2CH_3	Ph	
806	CHF_2	H	H	Cl	F	$CH_2C{\equiv}CH$	Ph	
807	CF_3	H	H	H	F	CH_2CF_3	Ph	
808	CF_3	H	H	H	F	CH_2Cl	Ph	
809	CF_3	H	H	H	F	CH_2CH_2Br	Ph	
810	CF_3	H	H	H	F	CH_2OEt	Ph	
811	CF_3	H	H	H	F	CH_2CH_2OMe	Ph	
812	CF_3	H	H	H	F	CH_2cPent	Ph	
813	CF_3	H	H	H	F	CH_2cHex	Ph	
814	CF_3	H	H	H	F	CH_2cPr-2,2--Cl_2	Ph	
815	CF_3	H	H	H	F	CH_2cPr-2,2-- Brz	Ph	
816	CF_3	H	H	H	F	CH_2SMe	Ph	$n_D^{23.2}$ 1.5469
817	CF_3	H	H	H	F	CH_2SOMe	Ph	$n_D^{20.0}$ 1. 5462
818	CF_3	H	H	H	F	CH_2SO_2Me	Ph	116-117
819	CF_3	H	H	H	F	CH_2CO_2Me	Ph	$n_D^{22.8}$ 1.5194
820	CF_3	H	H	H	F	CH_2CO_2Et	Ph	$n_D^{22.8}$ 1.5167
821	CF_3	H	H	H	F	$CH_2CH_2CO_2Me$	Ph	
822	CF_3	H	H	H	F	CH_2NMe_2	Ph	
823	CF_3	H	H	H	F	CH_2NHMe	Ph	
824	CF_3	H	H	H	F	$CH_2CH_2NMe_2$	Ph	
825	CF_3	H	H	H	F	CH_2CONH_2	Ph	$n_D^{24.5}$ 1.5380
826	CF_3	H	H	H	F	$CH_2CONHMe$	Ph	
827	CF_3	H	H	H	F	CH_2CONMe_2	Ph	$n_D^{23.3}$ 1.5302
828	CF_3	H	H	H	F	$CH_2CH{=}CHCF_3$	Ph	
829	CF_3	H	H	H	F	$CH_2CH{=}CF_2$	Ph	

Table 3. (continued)

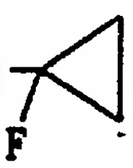
(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
830	CF_3	H	H	H	F	$CH_2C(Br)=CH_2$	Ph	
831	CF_3	H	H	H	F	$CH_2C\equiv CCH_3$	Ph	
832	CF_3	H	H	H	F	$CH_2CH_2C\equiv CH$	Ph	
833	CF_3	H	H	H	F	$CH_2C\equiv CCF_3$	Ph	
834	CF_3	H	H	F	F	CH_2CF_3	Ph	
835	CF_3	H	H	F	F	CH_2Cl	Ph	
836	CF_3	H	H	F	F	CH_2CH_2Br	Ph	
837	CF_3	H	H	F	F	CH_2OEt	Ph	
838	CF_3	H	H	F	F	CH_2CH_2OMe	Ph	
839	CF_3	H	H	F	F	CH_2cPent	Ph	
840	CF_3	H	H	F	F	CH_2cHex	Ph	
841	CF_3	H	H	F	F	CH_2-2,2-Cl_2-- cPr	Ph	
842	CF_3	H	H	F	F	CH_2-2,2-Br_2-- cPr	Ph	
843	CF_3	H	H	F	F	CH_2SMe	Ph	
844	CF_3	H	H	F	F	CH_2SOMe	Ph	
845	CF_3	H	H	F	F	CH_2SO_2Me	Ph	
846	CF_3	H	H	F	F	CH_2CO_2Me	Ph	
847	CF_3	H	H	F	F	CH_2CO_2Et	Ph	$n_D^{24.0}$ 1.5066
848	CF_3	H	H	F	F	$CH_2CH_2CO_2Me$	Ph	
849	CF_3	H	H	F	F	CH_2NMe_2	Ph	
850	CF_3	H	H	F	F	CH_2NHMe	Ph	
851	CF_3	H	H	F	F	$CH_2CH_2NMe_2$	Ph	
852	CF_3	H	H	F	F	CH_2CONH_2	Ph	
853	CF_3	H	H	F	F	$CH_2CONHMe$	Ph	
854	CF_3	H	H	F	F	CH_2CONMe_2	Ph	
855	CF_3	H	H	F	F	$CH_2CH=CHCF_3$	Ph	
856	CF_3	H	H	F	F	$CH_2CH=CF_2$	Ph	
857	CF_3	H	H	F	F	$CH_2C(Br)=CH_2$	Ph	
858	CF_3	H	H	F	F	$CH_2C\equiv CCH_3$	Ph	
859	CF_3	H	H	F	F	$CH_2CH_2C\equiv CH$	Ph	
860	CF_3	H	H	F	F	$CH_2C\equiv CCF_3$	Ph	
861	CF_3	H	H	H	F	CH_2cPr	Ph-2-Cl	82-83
862	CF_3	H	H	H	F	CH_2cPr	Ph-4-Br	89-90
863	CF_3	H	H	H	F	CH_2cPr	Ph-2-Cl-4-F	
864	CF_3	H	H	H	F	CH_2cPr	Ph-2-Br-4-Me	
865	CF_3	H	H	H	F	CH_2cPr	Ph-4-Et	
866	CF_3	H	H	H	F	CH_2cPr	Ph-4-OEt	
867	CF_3	H	H	H	F	CH_2cPr	Ph-4-OiPr	
868	CF_3	H	H	H	F	CH_2cPr	Ph-4-$OCH_2CH=CH_2$	65-67
869	CF_3	H	H	H	F	CH_2cPr	Ph-4-$OCH_2C\equiv CH$	77-78
870	CF_3	H	H	H	F	CH_2cPr	Ph-3-CF_3	77-78
871	CF_3	H	H	H	F	CH_2cPr	Ph-4-CF_3	124-125
872	CF_3	H	H	H	F	CH_2cPr	Ph -4-CF_2CF_2H	
873	CF_3	H	H	H	F	CH_2cPr	Ph-4-OCF_3	96-97

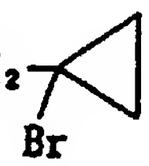
Table 3. (continued)

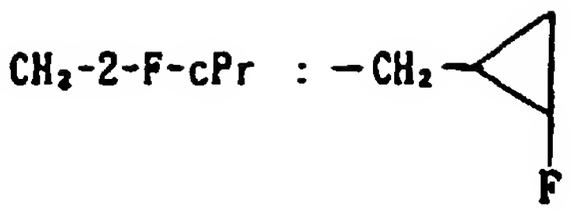
(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
874	CF_3	H	H	H	F	CH_2cPr	Ph-4-OCF_2H	
875	CF_3	H	H	H	F	CH_2cPr	Ph-4-OCF_2CF_3	
876	CF_3	H	H	H	F	CH_2cPr	Ph-4-OCF_2CF_2H	
877	CF_3	H	H	H	F	CH_2cPr	1-Me-2-Pyrrolyl	
878	CF_3	H	H	H	F	CH_2cPr	1-Me-3-Pyrrolyl	
879	CF_3	H	H	H	F	CH_2cPr	2-Pyrrolyl	
880	CF_3	H	H	H	F	CH_2cPr	3-Pyrrolyl	
881	CF_3	H	H	F	F	CH_2cPr	Ph-2-Cl	
882	CF_3	H	H	F	F	CH_2cPr	Ph-4-Br	
883	CF_3	H	H	F	F	CH_2cPr	Ph-2-Cl-4-F	
884	CF_3	H	H	F	F	CH_2cPr	Ph-2-Br-4-CH_3	
885	CF_3	H	H	F	F	CH_2cPr	Ph-4-Et	
886	CF_3	H	H	F	F	CH_2cPr	Ph-4-OEt	
887	CF_3	H	H	F	F	CH_2cPr	Ph-4-OiPr	
888	CF_3	H	H	F	F	CH_2cPr	Ph-4-$OCH_2CH=CH_2$	
889	CF_3	H	H	F	F	CH_2cPr	Ph-4-$OCH_2C\equiv CH$	
890	CF_3	H	H	F	F	CH_2cPr	Ph-3-CF_3	
891	CF_3	H	H	F	F	CH_2cPr	Ph-4-CF_3	
892	CF_3	H	H	F	F	CH_2cPr	Ph-4-CF_2CF_2H	
893	CF_3	H	H	F	F	CH_2cPr	Ph-4-OCF_3	
894	CF_3	H	H	F	F	CH_2cPr	Ph-4-OCF_2H	
895	CF_3	H	H	F	F	CH_2cPr	Ph-4-OCF_2CF_3	
896	CF_3	H	H	F	F	CH_2cPr	Ph-4-OCF_2CF_2H	
897	CF_3	H	H	F	F	CH_2cPr	1-Me-2-Pyrrolyl	
898	CF_3	H	H	F	F	CH_2cPr	1-Me-3-Pyrrolyl	
899	CF_3	H	H	F	F	CH_2cPr	2-Pyrrolyl	
900	CF_3	H	H	F	F	CH_2cPr	3-Pyrrolyl	
901	CF_3	H	H	F	Br	CH_2cPr	Ph	$n_D^{22.0}$ 1.5349
902	CF_3	H	H	H	Et	CH_2cPr	Ph	
903	CF_3	H	H	H	nPr	CH_2cPr	Ph	
904	CF_3	H	H	H	nBu	CH_2cPr	Ph	
905	CF_3	H	H	H	tBu	CH_2cPr	Ph	
906	CF_3	H	H	H	C_2F_5	CH_2cPr	Ph	
907	CF_3	H	H	H	OEt	CH_2cPr	Ph	
908	CF_3	H	H	H	OnPr	CH_2cPr	Ph	
909	CF_3	H	H	H	OiPr	CH_2cPr	Ph	
910	CF_3	H	H	H	OtBu	CH_2cPr	Ph	
911	CF_3	H	H	OEt	F	CH_2cPr	Ph	
912	CF_3	H	H	OnPr	F	CH_2cPr	Ph	
913	CF_3	H	H	OiPr	F	CH_2cPr	Ph	
914	CF_3	H	H	OtBu	F	CH_2cPr	Ph	
915	CF_3	H	H	H	SOMe	CH_2cPr	Ph	$n_D^{23.3}$ 1.5450
916	CF_3	H	H	H	SO_2Me	CH_2cPr	Ph	144-146
917	CF_3	H	H	H	SEt	CH_2cPr	Ph	

Table 3. (continued)

(r^1, r^2 =H)								
No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2	Physical const. mp (°C) refractive index
918	CF_3	H	H	H	S-iPr	CH_2cPr	Ph	
919	CF_3	H	H	SOMe	F	CH_2cPr	Ph	
920	CF_3	H	H	SO_2Me	F	CH_2cPr	Ph	
921	CF_3	H	H	SEt	F	CH_2cPr	Ph	
922	CF_3	H	H	S-iPr	F	CH_2cPr	Ph	
923	CF_3	H	H	OCF_3	F	CH_2cPr	Ph-4-OMe	
924	CF_3	H	H	OCF_3	F	CH_2cPr	Ph-2-F	
925	CF_3	H	H	OCF_3	F	CH_2cPr	Ph-4-F	
926	CF_3	H	H	OCF_3	F	CH_2cPr	Ph	
927	CF_3	H	H	NO_2	OCH_3	CH_2cPr	Ph	
928	CF_3	H	H	NHAc	F	CH_2cPr	Ph	
929	CF_3	H	H	NH_2	F	CH_2cPr	Ph	
930	CF_3	H	H	F	F	CH_2COOH	Ph	113-120
931	CF_3	H	H	F	F	CH_2cPr	2-imidazolyl	
932	CF_3	H	H	F	F	CH_2cPr	1-methyl-2--imidazolyl	
933	CF_3	H	H	F	F	CH_2cPr	1-methyl-2--oxazolyl	
934	CF_3	H	H	F	F	CH_2cPr	2-isoxazolyl	
935	CF_3	H	H	F	F	CH_2cPr	1-methyl-2--isoxazolyl	
936	CF_3	H	H	F	F	CH_2cPr	2-pyrimidinyl	
937	CF_3	H	H	F	F	CH_2cPr	4,6-dimethyl-2-pyrimidinyl	
938	CF_3	H	H	F	F	CH_2cPr	2-thiazolyl	
939	CF_3	H	H	F	F	CH_2cPr	3-chloro-2--thiazolyl	
940	CF_3	H	H	F	F	CH_2cPr	1-pyrazinyl	
941	CF_3	H	H	F	F	CH_2cPr	3-mrthyl-1--pyrazinyl	
942	CF_3	H	H	F	F	CH_2cPr	3-pyridazinyl	
943	CF_3	H	H	F	F	CH_2cPr	3-methyl-4--pyridazinyl	
944	CF_3	H	H	F	F	CH_2cPr	2-furyl	
945	CF_3	H	H	F	F	CH_2cPr	3-bromo-2--furyl	
946	CF_3	H	H	F	F	CH_2cPr	4-thiazolyl	

CH_2-1-F-cPr : 

CH_2-1-Br-cPr : 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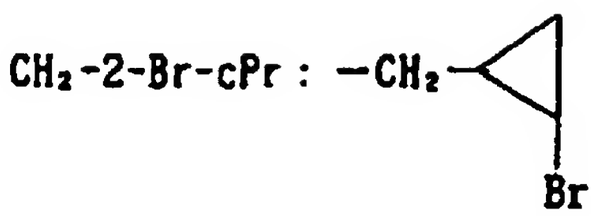
F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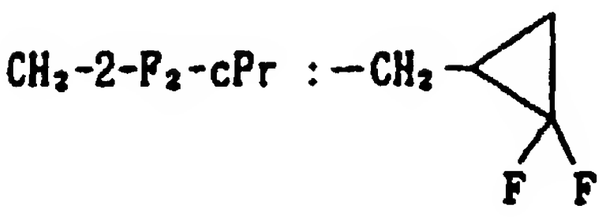
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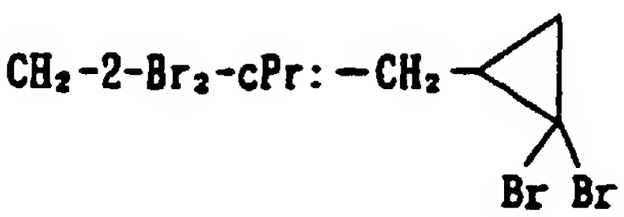
F F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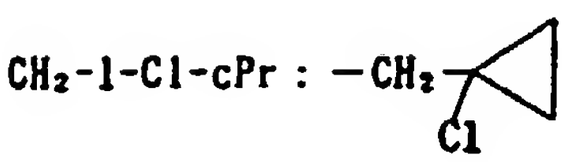
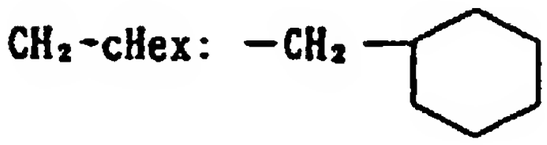
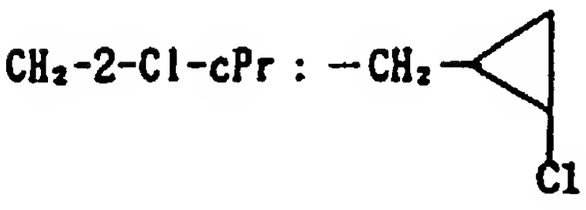
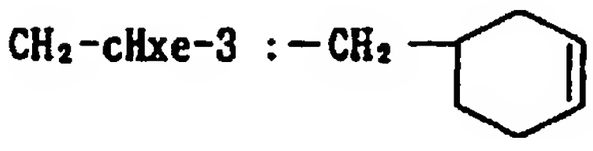
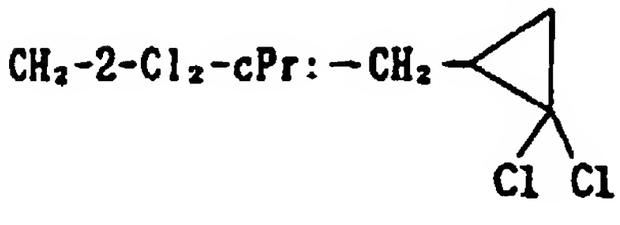
Br Br

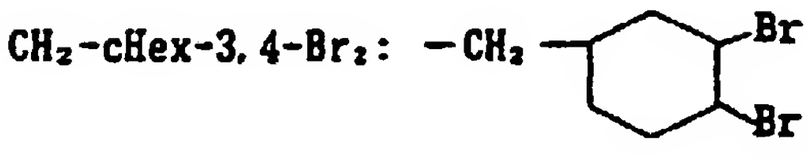

CH2-1-Cl-cPr : —CH2
Cl


CH2-cHex: —CH2


CH2-2-Cl-cPr : —CH2
Cl


CH2-cHxe-3 : —CH2


CH2-2-Cl2-cPr: —CH2
Cl Cl


CH2-cHex-3,4-Br2: —CH2
Br
Br

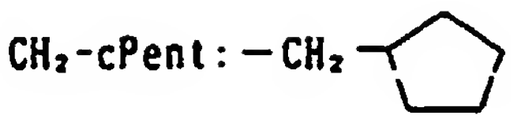
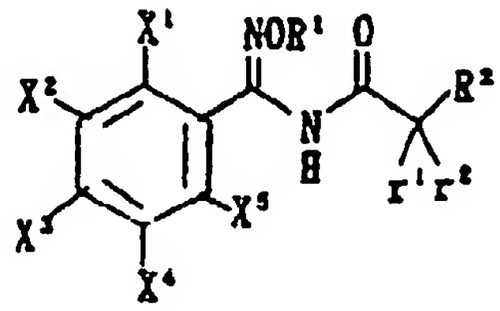

CH2-cPent: —CH2

Table 4.



No.	X^1	X^2	X^3	X^4	X^5	R^1	r_1	r_2	R^2	Physical const. mp. (℃)/ refractive index
947	CF_3	H	H	F	F	CH_2cPr	OMe	H	Ph	25.4-1.5069
948	CF_3	H	H	F	F	CH_2cPr	Me	H	Ph	25.5-1.5106
949	CF_3	H	H	F	F	CH_2cPr	Et	H	Ph	25.4-1.5003
950	CF_3	H	H	F	F	CH_2cPr	OMe	CF_3	Ph	25.5-1.4855
951	CF_3	H	H	F	F	CH_2cPr	F	H	Ph	25.5-1.5059
952	CF_3	H	H	F	F	CH_2cPr	Cl	H	Ph	25.5-1.5244
953	CF_3	H	H	F	F	CH_2cPr	SMe	H	Ph	25.5-1.5220
954	CF_3	H	H	F	F	CH_2cPr	=O		Ph	79-81
955	CF_3	H	H	F	F	CH_2cPr	Me	Me	Ph	25.6-1.5105
956	CF_3	H	H	F	F	CH_2cPr	F	F	Ph	50-52
957	CF_3	H	H	F	F	CH_2cPr	NHMe	H	Ph	
958	CF_3	H	H	Cl	F	CH_2cPr	OMe	H	Ph	
959	CF_3	H	H	Cl	F	CH_2cPr	Me	H	Ph	
960	CF_3	H	H	Cl	F	CH_2cPr	Et	H	Ph	
961	CF_3	H	H	Cl	F	CH_2cPr	OMe	CF_3	Ph	
962	CF_3	H	H	Cl	F	CH_2cPr	F	H	Ph	
963	CF_3	H	H	Cl	F	CH_2cPr	Cl	H	Ph	
964	CF_3	H	H	Cl	F	CH_2cPr	SMe	H	Ph	
965	CF_3	H	H	Cl	F	CH_2cPr	=O		Ph	

Table 4 (continued)

No.	X^1	X^2	X^3	X^4	X^5	R^1	r_1	r_2	R^2	Physical const. mp. (℃)/ refractive index
966	CF_3	H	H	Cl	F	CH_2cPr	Me	Me	Ph	
967	CF_3	H	H	Cl	F	CH_2cPr	F	F	Ph	
968	CF_3	H	H	Cl	F	CH_2cPr	NHMe	H	Ph	
969	CF_3	H	H	F	Cl	CH_2cPr	OMe	H	Ph	
970	CF_3	H	H	F	Cl	CH_2cPr	Me	H	Ph	
971	CF_3	H	H	F	Cl	CH_2cPr	Et	H	Ph	
972	CF_3	H	H	F	Cl	CH_2cPr	OMe	CF_3	Ph	
973	CF_3	H	H	F	Cl	CH_2cPr	F	H	Ph	
974	CF_3	H	H	F	Cl	CH_2cPr	Cl	H	Ph	
975	CF_3	H	H	F	Cl	CH_2cPr	SMe	H	Ph	
976	CF_3	H	H	F	Cl	CH_2cPr	=O		Ph	
977	CF_3	H	H	F	Cl	CH_2cPr	Me	Me	Ph	
978	CF_3	H	H	F	Cl	CH_2cPr	F	F	Ph	
979	CF_3	H	H	F	Cl	CH_2cPr	NHMe	H	Ph	
980	CF_3	H	H	Cl	Cl	CH_2cPr	OMe	H	Ph	
981	CF_3	H	H	Cl	Cl	CH_2cPr	Me	H	Ph	
982	CF_3	H	H	Cl	Cl	CH_2cPr	Et	H	Ph	
983	CF_3	H	H	Cl	Cl	CH_2cPr	OMe	CF_3	Ph	
984	CF_3	H	H	Cl	Cl	CH_2cPr	F	H	Ph	
985	CF_3	H	H	Cl	Cl	CH_2cPr	Cl	H	Ph	
986	CF_3	H	H	Cl	Cl	CH_2cPr	SMe	H	Ph	
987	CF_3	H	H	Cl	Cl	CH_2cPr	=O		Ph	
988	CF_3	H	H	Cl	Cl	CH_2cPr	Me	Me	Ph	
989	CF_3	H	H	Cl	Cl	CH_2cPr	F	F	Ph	
990	CF_3	H	H	Cl	Cl	CH_2cPr	NHMe	H	Ph	

Table 4 (continued)

No.	X^1	X^2	X^3	X^4	X^5	R^1	r_1	r_2	R^2	Physical const. mp. (°C)/ refractive index
991	CF_3	H	H	H	F	CH_2cPr	OMe	H	Ph	
992	CF_3	H	H	H	F	CH_2cPr	Me	H	Ph	
993	CF_3	H	H	H	F	CH_2cPr	Et	H	Ph	
994	CF_3	H	H	H	F	CH_2cPr	OMe	CF_3	Ph	
995	CF_3	H	H	H	F	CH_2cPr	F	H	Ph	
996	CF_3	H	H	H	F	CH_2cPr	Cl	H	Ph	
997	CF_3	H	H	H	F	CH_2cPr	SMe	H	Ph	
998	CF_3	H	H	H	F	CH_2cPr	=O		Ph	
999	CF_3	H	H	H	F	CH_2cPr	Me	Me	Ph	
1000	CF_3	H	H	H	F	CH_2cPr	F	F	Ph	
1001	CF_3	H	H	H	F	CH_2cPr	NHMe	H	Ph	
1002	CF_3	H	H	F	F	Et	Me	H	Ph	
1003	CF_3	H	H	F	F	$CH_2C\equiv CH$	Me	H	Ph	
1004	CF_3	H	H	F	F	CH_2CH_2Cl	Me	H	Ph	
1005	CF_3	H	H	F	F	Et	Me	H	Ph-4-OMe	
1006	CF_3	H	H	F	F	$CH_2C\equiv CH$	Me	H	Ph-4-OMe	
1007	CF_3	H	H	F	F	CH_2CH_2Cl	Me	H	Ph-4-OMe	
1008	CF_3	H	H	F	Cl	Et	Me	H	Ph	
1009	CF_3	H	H	F	Cl	$CH_2C\equiv CH$	Me	H	Ph	
1010	CF_3	H	H	F	Cl	CH_2CH_2Cl	Me	H	Ph	
1011	CF_3	H	H	F	Cl	Et	Me	H	Ph-4-OMe	
1012	CF_3	H	H	F	Cl	$CH_2C\equiv CH$	Me	H	Ph-4-OMe	
1013	CF_3	H	H	F	Cl	CH_2CH_2Cl	Me	H	Ph-4-OMe	

Table 4 (continued)

No.	X^1	X^2	X^3	X^4	X^5	R^1	r_1	r_2	R^2	Physical const. mp. (℃)/ refractive index
1014	CF_3	H	H	Cl	F	Et	Me	H	Ph	
1015	CF_3	H	H	Cl	F	$CH_2C\equiv CH$	Me	H	Ph	
1016	CF_3	H	H	Cl	F	CH_2CH_2Cl	Me	H	Ph	
1017	CF_3	H	H	Cl	F	Et	Me	H	Ph-4-OMe	
1018	CF_3	H	H	Cl	F	$CH_2C\equiv CH$	Me	H	Ph-4-OMe	
1019	CF_3	H	H	Cl	F	CH_2CH_2Cl	Me	H	Ph-4-OMe	
1020	CF_3	H	H	Cl	Cl	Et	Me	H	Ph	
1021	CF_3	H	H	Cl	Cl	$CH_2C\equiv CH$	Me	H	Ph	
1022	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	Me	H	Ph	
1023	CF_3	H	H	Cl	Cl	Et	Me	H	Ph-4-OMe	
1024	CF_3	H	H	Cl	Cl	$CH_2C\equiv CH$	Me	H	Ph-4-OMe	
1025	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	Me	H	Ph-4-OMe	
1026	CF_3	H	H	H	F	Et	Me	H	Ph	
1027	CF_3	H	H	H	F	$CH_2C\equiv CH$	Me	H	Ph	
1028	CF_3	H	H	H	F	CH_2CH_2Cl	Me	H	Ph	
1029	CF_3	H	H	H	F	Et	Me	H	Ph-4-OMe	
1030	CF_3	H	H	H	F	$CH_2C\equiv CH$	Me	H	Ph-4-OMe	
1031	CF_3	H	H	H	F	CH_2CH_2Cl	Me	H	Ph-4-OMe	
1032	CF_3	H	H	F	F	CH_2CN	H	H	Ph	77-80
1033	CF_3	H	H	F	Cl	CH_2CN	H	H	Ph	
1034	CF_3	H	H	F	F	$CH_2CH(OEt)_2$	H	H	Ph	
1035	CF_3	H	H	F	Cl	$CH_2CH(OEt)_2$	H	H	Ph	
1036	CF_3	H	H	NO_2	OEt	CH_2cPr	H	H	Ph	62-63

*25.4−1.5069 means $n_D^{25.4}$ 1.5069 (refractive index) in the above tables.

^{1}H-NMR data ($CDCl_3$, δ ppm from TMS):

*1 Compound No. 346

0.1 ~0.2 (2H, m), 0.45 ~0.55 (2H, m), 0.95~1.1 (1H, m), 3.60 (2H, s), 3.8~3.9 (2H, m), 3.82 (3H, s), 6.92 (2H, d), 7.1~7.25 (3H, m), 7.51 (1H, dd), 8.53 (1H, brs)

[0045] The compounds of the present invention can show excellent fungicidal activity against wide varieties of fungi, and therefore, the compounds can be useful for plant disease control in the farming of agricultural and horticultural crops including ornamental flowers, turf and forage crops.

[0046] The examples for the plant diseases to be controlled with the compounds of the present invention are given in the following.

Paddy rice	Blast	(Pyricularia oryzae)
	Sheath blight	(Rhizoctonia solani)
	Bakanae disease	(Gibberella fujikuroi)
	Heiminthosporium leaf spot	(Cochliobolus miyabeanus)
Barley	Loose smut	(Ustilago nuda)
Wheat	Scab	(Gibberella zeae)
	Leaf rust	(Puccinia recondita)
	Eye spot	(Pseudocercosporella herpotrichoides)
	Glume blotch	(Leptosphaeria nodorum)
	Powdery mildew	(Erysiphe graminis f. sp. tritici)
	Fusarium snow blight	(Micronectriella nivalis)
Potato	Late blight	(Phytophthora infestans)
Ground nut	Leaf spot	(Mycosphaerella aradius)
Sugar beat	Cercospora leaf spot	(Cercospora beticola)
Cucumber	Powdery mildew	(Sphaerotheca fuliginea)
	Sclerotinia rot	(Sclerotinia sclerotiorum)
	Gray mold	(Botrytis cinerea)
	Downy mildew	(Pseudoperonospora cubensis)
Tomato	Leaf mold	(Cladosporium fulvum)
	Late blight	(Phytophthora infestans)
Egg plant Onion	Black rot	(Corynespora melongenae)
	Gray-mold neck rot	(Botrytis allii)
Strawberry	Powdery mildew	(Sphaerotheca humuli)
Apple	Powdery mildew	(Podosphaera leucotricha)
	Scab	(Venturia inaequalis)
	Blossom blight	(Monilinia mali)
Persimmon	Anthracnose	(Gloeosporium kaki)
Peach	Brown rot	(Monilinia fructicola)
Grape	Powdery mildew	(Uncinula necator)
	Downy mildew	(Plasmopara viticola)

(continued)

Pear	Rust	(Gymnosporangium asiaticum)
	Black spot	(Alternaria kikuchiana)
Tea-plant	Leaf spot	(Pestalotia theae)
	Anthracnose	(Colletotrichum theae-sinensis)
Orange	Scab	(Elsinoe fawcetti)
	Blue mold	(Penicillium italicum)
Turf	Sclerotinia snow blight	(Sclerotinia borealis)

[0047] In recent years, it is known that various pathogenic fungi have developed their resistance to benzimidazole fungicides and ergosterol biosynthesis inhibitors and that such fungicides have been insufficient in their fungicidal effectiveness. Therefore, it is required to provide new compounds useful as a fungicide which are effective to the resistant-strain of such pathogenic fungi as well. The compounds of the present invention are the ones which can be a fungicide having excellent fungicidal effectiveness not only to the susceptible-strains of pathogenic fungi but also to the resistant-strains of pathogenic fungi to benzimidazole fungicides and ergosterol biosynthesis inhibitors.

[0048] For the preferable examples of plant diseases to be applied with the compounds of the present invention, powdery mildew on wheat, powdery mildew on cucumber, powdery mildew on strawberries, etc. can be given.

[0049] The compounds of the present invention can be utilized as an antifouling agent for preventing the adhesion of aqueous organisms to structures, such as the bottom of a ship and fishing nets, in water and sea.

[0050] Also, the compounds of the present invention can be contained in paints and fibers and thereby used as an antimicrobial agent for walls, bathtubs, shoes and clothes.

[0051] Furthermore, some of the compounds of the present invention can show insecticidal, acaricidal and herbicidal activities.

[0052] In the practical application of the compounds of the present invention obtained as described above, the compounds can be used in the state as it is without formulation, or, for the use as agricultural plant protection chemicals, the compounds can be applied in forms of general formulations for agricultural plant protection chemicals, such as wettable powders, granules, powders, emulsifiable concentrates, aqueous solutions, suspensions and flowables. For the additives and carriers to be used in the formulations described above, vegetable powders, such as soybean powder and wheat powder, mineral fine powders, such as diatomaceous earth, apatite, gypsum, talc, bentonite. pyrophyllite and clay. and organic and inorganic compounds, such as sodium benzoate, urea and Glauber's salt, can be used, when the compounds are formulated into solid formulations. Whereas, when the compounds are formulated into liquid formulations, petroleum fractions. such as kerosine. xylene and solvent naphtha, cyclohexane, cyclohexanone, dimethyl formamide, dimethyl sulfoxide, alcohols, acetone, trichloro ethylene. methylisobutyl ketone, mineral oils. vegetable oils and water, can be used as the solvent. In these formulations, surface active agents may be added to the formulations in order to make the formulations homogeneous and stable, if appropriate.

[0053] The content of the compound of the present invention as the active principle in the formulations is preferably in a range of from 5 to 70%. The wettable powders, the emulsifiable concentrates and the flowable formulation comprising the compound of the present invention prepared as described above can be applied in a form prepared by diluting the formulations with water to the suspension or the emulsion at a desired concentrations, while the powders and the granules of the said compound can be directly applied to plants without dilution.

[0054] The compounds of the present invention can demonstrate sufficient effectiveness on plant diseases independently, however, it is also possible to use the said compound in admixing with 1 or more of other fungicides, insecticides, acaricides or synergists.

[0055] The followings are the examples for the fungicides, insecticides, acaricides, nematocides and plant growth regulators, those which are usable in admixing with the compounds of the present invention.

Fungicides:

Copper-based fungicides:

[0056] Basic copper chloride, basic copper sulfate, etc.

Sulphur-based fungicides:

[0057] Thiram, maneb, mancozeb, polycarbamate, propineb. ziram, zineb, etc.

Polyhaloalkylthio fungicides:

[0058] Captan. dichlofluanid, folpet, etc.

Organochlorine fungicides:

[0059] Chlorothalonil, fthalide, etc.

Organophosphorous fungicides:

[0060] IBP, EDDP, tolclofos-methyl, pyrazophos. fosetyl-Al, etc.

Benzimidazole fungicides:

[0061] Thiophanate-methyl, benomyl, carbendazim, thiabendazole, etc.

Dicarboxyimide fungicides:

[0062] Oxycarboxine, mepronyl, flutolanil, techlofthalam, trichlamide, pencycuron, etc.

Acyl alanine fungicides:

[0063] Metalaxyl, oxadixyl, furalaxyl etc.

EBI fungicides:

[0064] Triadimefon, triadomenol, bitertanol, microbutanil, hexaconazol, propiconazole, triflumizole, procloraz, peflazoate, fenarimol, pyrifenox, trifolin, flusilazole, etaconazole, diclobutrazol, fluotrimazole, flutriafen, penconazole, diniconazole, cyproconazole, imazalil, tridemorph, fenpropimorph, buthiobate, etc.

Antibiotics:

[0065] Polyoxin, blasticidin-S, kasugamycin, validamycin, streptomycin sulfate, etc.

Others:

[0066] Propamocarb hydrochloride salt, quintozene, hydroxyisoxazole, metasulfocarb, anilazine, isoprothiolane, probenazole, quinomethionate, dithianone, dinocap, dichlomezine, mepaniprim, ferimzone, fluazinam, pyroquilon, tricyclazole, oxolinic acid, dithianone, iminoctazine acetate salt, cymoxanil, pyrrolenitrine, metasulfocarb, diethofencarb, binapacryl, lecithin, sodium hydrogencarbonate, fenaminosulf, dodine, dimethomorph, fenazine oxide, etc.

Insecticides and Acaricides:

Organophosphorous and carbamate insecticides:

[0067] Fenthion, fenitrothion, diazinon, chlorpyrifos. ESP, vamidothion, fenthoate, dimethoate. formothion, malathon, trichlorfon. thiometon, phosmet, dichlorvos, acephate. EPBP, methyl parathion, oxydimeton methyl. ethion, salithion, cyanophos, isoxathion, pyridafenthion, phosalon, methydathion, sulprofos, chlorfenvinphos, tetrachlorvinphos, dimethylvinphos. propaphos, isofenphos, ethylthiometon, profenofos. pyraclophos, monocrotophos, azinphos methyl, aldicarb, methomyl, thiodicarb. carbofuran, carbosulfan, benfuracarb. furathiocarb. propoxur. BPMC, MTMC, MIPC, carbaryl, pirimicarb, ethiofencarb, fenoxycarb, cartap. thiocyclam, bensultap, etc.

Pyrethroid insecticides:

[0068] Permethrin, cypermethrin, deltamethrin, fenvalerate, fenpropathrin, pyrethrin. allethrin, tetramethrin, resmethrin, dimethrin, propathrin, fenothrin, prothrin, fluvalinate, cyfluthrin, cyhalothrin, flucythrinate, ethofenprox, cycloprothrin, tralomethrin, silafluophen, brofenprox, acrinathrin, etc.

Benzoyl urea-based insecticides and others:

[0069] Diflubenzuron, chlorfluazuron, hexaflumuron, triflumuron, tetrabenzuron, flufenoxuron. flucycloxuron, buprofezin, pyriproxyfen, methoprene, benzoepin, diaphenthiuron, imidacloprid, fipronil, nicotine sulfate, rotenone, metaaldehyde, machine oil, Bacillus thuringiensis, microbial insecticides such as insect-pathogenic viruses. etc.

Nematocides:

[0070] Fenamiphos, phosthiazate, etc.

Acaricides:

[0071] Chlorbenzilate, phenisobromolate, dicofol, amitraz, BPPS, benzomate, hexythiazox, fenbutatin oxide, polynactin, quinomethionate, CPCBS, tetradifon, avermectin. milbemectin, chlofentezin, cyhexatin, pyridaben, fenpyroximate. tebufenpyrad, pyrimidifen, fenothiocarb, dienochlor, etc.

Plant Growth Regulators:

[0072] Gibberellines (Gibberelline A_3, Gibberelline A_4, Gibberelline A_7, etc.). IAA, and NAA.

[0073] Now, the examples of the formulations comprising the compound of the present invention are described hereinbelow, however. it should be noted that the type and the rate of the additives shall not be limited to the ones described in the examples and can be replaced by wide range of other additives and/or carriers. In the examples hereinbelow, a part mentioned in each of the formulation examples represents a part by weight.

Example 3 : Wettable Powder

[0074]

The compound of the present invention	40 parts
Diatomaceous earth	53 parts
Sulfuric acid ester of higher alcohol	4 parts
Alkyl naphthalene sulfonate	3 parts

[0075] All components are admixed and micronized to fine powder, thereby affording the wettable powder formulation containing the active principle at a concentration of 40%.

Example 4 : Emulsifiable Concentrate

[0076]

The compound of the present invention	30 parts
Xylene	33 parts
Dimethyl formamide	30 parts
Polyoxy ethlene alkylally ether	7 parts

[0077] All components are admixed and then dissolved into a solution, thereby affording the emulsifiable concentrate formulation containing the active principle at a concentration of 30%.

Example 5 : Dust Formulation

[0078]

The compound of the present invention	10 parts
Talc	89 parts
Polyoxy ethlene alkylally ether	1 parts

[0079] All components are admixed and pulverized to fine dusting powder. thereby affording the dust formulation containing the active principle at a concentration of 10%.

Example 6 : Granular Formulation

[0080]

The compound of the present invention	5 parts
Clay	73 parts
Bentonite	20 parts
Sodium salt of dioctylsulfosuccinate	1 part
Sodium phosphate	1 part

[0081] All components are admixed, pulverized and then kneaded thoroughly while adding water, and then further granulated and dried, thereby affording the granular formulation containing the active principle at a concentration of 5%.

Example 7 : Suspension

[0082]

The compound of the present invention	10 parts
Sodium lignin sulfonate	4 parts
Sodium dodecyl benzene sulfonate	1 part
Xanthane Gum	0.2 part
Water	84.8 parts

[0083] All components are admixed and subjected to wet grinding up to the particle size of less than 1μ, thereby affording the suspension containing the active principle at a concentration of 10%.

[0084] Now, the usefulness of the compounds of the present invention as the active principle of a plant protection chemical for controlling various plant diseases is shown in Test Examples described hereinbelow. The effectiveness of the compounds on plant disease control were assessed basing on the pathological changes in the state of plants provided, namely the degree of disease-induced lesion on leaves, stems and other parts of the plants was visually observed, respectively. The assessment was conducted by giving scores in effectiveness on plant diseases to each test plots as the following.

Score, 5; If no lesion were observed.
Score, 4; If the degree of the lesion observed were approximately 10% of the degree in the untreated plot.
Score, 3; If the degree of the lesion observed were approximately 25% of the degree in the untreated plot.
Score, 2; If the degree of the lesion observed were approximately 50% of the degree in the untreated plot.
Score. 1; If the degree of the lesion observed were approximately 75% of the degree in the untreated plot.
Score. 0; If the degree of the lesion observed were almost same as the degree in the untreated plot.

Test Example 1 : Preventive Control Efficacy Test on Wheat Powdery Mildew

[0085] To young seedlings of wheat (Variety: Chihoku) grown in an unglazed pot, the emulsion at a concentration of 12.5 ppm prepared from the emulsifiable concentrate comprising the compound of the present invention were sprayed throughly. After the spraying, the seedlings were dried under natural condition and then inoculated by means of sprinkling with the conidia of the fungus causing wheat powdery mildew (Erysiphe graminla f. sp. tritici) and placed in a greenhouse maintained at around 20 °C for 7 days in order to complete the infection. Appearance of the lesion on leaves cause by the disease was assessed and compared with the lesion on leaves in the untreated plot, thereby evaluating the preventive efficacy of the compound to the disease. The results are shown in Table 5.

Test Example 2 : Preventive Control Efficacy Test on Cucumber Powdery Mildew

[0086] To young seedlings of cucumber (Variety: Sagami-Hanjiro) grown in an unglazed pot, the emulsion at a concentration of 12.5 ppm prepared from the emulsifiable concentrate comprising the compound of the present invention

were sprayed. After the spraying, the seedlings were dried under natural condition and then inoculated by means of sprinkling with the conidia of the fungus causing cucumber powdery mildew (Sphaerotheca fuliginea) and placed in a temperature-controlled room maintained at around 25°C for 11 days in order to complete the infection. Appearance of powdery mildew-causing lesion on the leaves whereto the compound was sprayed was assessed and compared with the lesion appeared on leaves in the untreated plot, thereby evaluating the preventive efficacy of the compound to the disease. The results are shown in Table 5.

[0087] As shown in Table 5, it is demonstrated that the compounds of the present invention can show superior preventive control efficacy to not only wheat powdery mildew but also cucumber powdery mildew in comparison with other compounds tested.

Test Example 3 : Test on Cucumber Powdery Mildew Control with Vapour

[0088] 10 μl of the emulsion at a concentration of 500 ppm prepared from the emulsifiable concentrate comprising the compound of the present invention were fed dropwise onto round aluminium foils each having a diameter of 1 cm and dried at room temperature under natural condition.

[0089] The aluminium foils were then fixed on the upper side of the leaves of cucumber seedlings (Variety: Sagami-Hanjiro) grown in an unglazed pot. After 24 hours, the cucumber leaves were inoculated by means of sprinkling with the conidia of the fungus causing cucumber powdery mildew (Sphaerotheca fuliginea) and placed in a temperature-controlled room maintained at around 25°C for 11 days in order to complete the infection. Appearance of powdery mildew-causing lesion on the leaves placed with the aluminium foil was assessed and compared with the lesion appeared on the leaves in the untreated plot. The control efficacy with the vapour of the compound to the disease was confirmed in case that disease lesion-free circle having a diameter of more than 2 cm is formed around the aluminium foil fixed on a leaf. The results are shown in Table 5.

[0090] On the other hand, other compounds for the comparison, which are disclosed in Japanese Patent Laid-opened No. Hei 2-6453 (see Table 5), did not show the control efficacy with the vapour to the disease.

[0091] Since the compounds of the present invention have vapour action, it is suggested that the compound of the present invention can show plant disease control efficacy even in the inner space of leaves and fruits of crops whereto spraying of a fungicide in even condition is generally rather difficult.

Table 5.

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
1	12.5	5	5	
3	12.5	5	5	
4	12.5	5	5	
5	12.5	5	5	
6	12.5	5	5	
7	12.5	4	5	
8	12.5	5	5	
9	12.5	5	5	
10	12.5	4	5	
11	12.5	5	5	
12	12.5	5	5	
13	12.5	5	5	
18	12.5	2	4	
19	12.5	4	5	
20	12.5	4	5	
22	12.5	5	5	
24	12.5	5	5	good
25	12.5	5	5	
27	12.5	5	5	
28	12.5	4	4	

Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
29	12.5	4	4	
30	12.5	5	4	
32	12.5	4	4	
33	12.5	3	5	
34	12.5	4	5	good
35	12.5	5	5	good
36	12.5	5	4	
37	12.5	4	5	good
38	12.5	5	4	
39	12.5	5	5	good
42	12.5	5	5	good
43	12.5	5	5	good
44	12.5	5	5	good
45	12.5	4	4	
46	12.5	5	5	
47	12.5	5	5	good
48	12.5	5	5	good
49	12.5	5	5	
50	12.5	5	5	good
51	12.5	5	5	good
52	12.5	5	5	good
53	12.5	5	5	
54	12.5	5	5	good
55	12.5	5	5	

Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
56	12.5	5	5	good
57	12.5	5	5	good
58	12.5	4	4	
59	12.5	4	4	
60	12.5	4	5	
62	12.5	4	5	
64	12.5	4	4	
65	12.5	5	5	
66	12.5	5	5	
68	12.5	5	5	
71	12.5	5	4	
74	12.5	5	5	
82	12.5	5	5	
96	12.5	5	5	good
99	12.5	5	5	good
105	12.5	5	5	good
112	12.5	5	5	good
113	12.5	5	5	good
114	12.5	4	5	
115	12.5	4	5	
140	12.5	3	5	good

Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
149	12.5	5	5	good
156	12.5	5	5	good
157	12.5	5	5	good
209	12.5	4	4	
211	12.5	4	4	
212	12.5	5	5	
234	12.5	5	5	good
239	12.5	5	5	good
240	12.5	5	5	good
241	12.5	5	5	good
242	12.5	5	5	good
255	12.5	5	5	good
258	12.5	5	5	good
260	12.5	5	5	good
262	12.5	5	5	good
263	12.5	5	5	
264	12.5	5	5	good
266	12.5	5	5	
267	12.5	5	5	good
268	12.5	5	5	
269	12.5	5	5	good
270	12.5	5	5	good
271	12.5	5	5	

Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
272	12.5	5	5	good
273	12.5	5	5	good
274	12.5	5	5	
275	12.5	5	5	
276	12.5	5	4	
277	12.5	5	5	
279	12.5	5	5	good
280	12.5	5	5	
286	12.5	5	5	
287	12.5	5	5	
288	12.5	5	5	
289	12.5	5	5	
290	12.5	5	5	good
293	12.5	4	5	
304	12.5	5	5	
307	12.5	5	5	
309	12.5	5	5	good
311	12.5	5	5	good
312	12.5	5	5	
313	12.5	5	5	good

Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
315	12.5	5	5	
316	12.5	5	5	
319	12.5	5	5	good
320	12.5	5	5	
321	12.5	5	5	
322	12.5	5	5	
323	12.5	5	5	
324	12.5	4	4	
326	12.5	5	5	
328	12.5	5	5	good
333	12.5	5	5	good
346	12.5	5	4	
347	12.5	4	4	
348	12.5	3	4	
349	12.5	4	5	
351	12.5	5	4	good
352	12.5	5	4	good
353	12.5	5	4	good

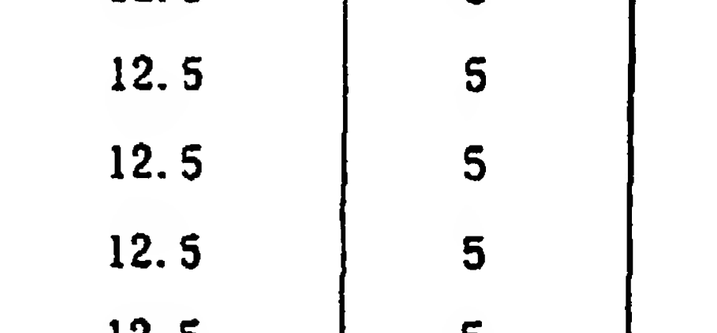
Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
364	12.5	5	5	good
367	12.5	5	5	good
368	12.5	5	5	good
370	12.5	5	5	good
371	12.5	5	5	good
372	12.5	5	5	good
373	12.5	5	5	good
374	12.5	5	5	good
375	12.5	5	5	good
376	12.5	5	5	good
377	12.5	5	5	good
378	12.5	5	5	
379	12.5	5	5	good
381	12.5	5	5	good
383	12.5	5	5	good
386	12.5	5	5	good
389	12.5	5	5	good
391	12.5	5	5	
392	12.5	5	5	good

Table 5 (continued)

No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
393	12.5	5	5	good
395	12.5	5	5	good
396	12.5	5	5	good
399	12.5	4	5	
400	12.5	5	5	
401	12.5	5	5	good
402	12.5	5	5	good
403	12.5	5	5	good
404	12.5	5	5	good
405	12.5	5	5	good
406	12.5	5	5	good
407	12.5	5	5	good
408	12.5	5	5	good
409	12.5	5	5	
410	12.5	5	5	
413	12.5	5	5	good
414	12.5	5	5	good
415	12.5	5	5	good
429	12.5	5		

Table 5 (continued)

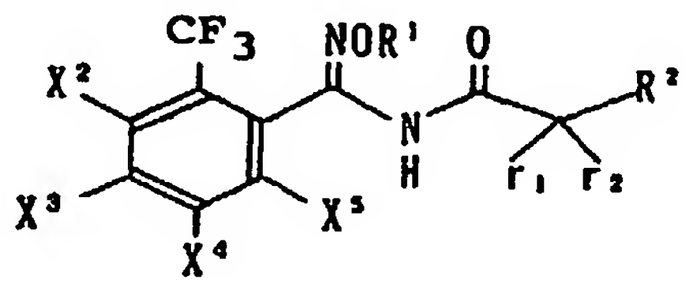
No.	Concentration of active ingredient (ppm)	Wheat Powdery mildew	Cucumber Powdery mildew	Vapar action
430	12.5	5		
442	12.5	5	5	good
445	12.5	5	5	good
447	12.5	5	5	good
451	12.5	5	5	good
453	12.5	5	5	good
454	12.5	5	5	good
455	12.5	5	5	good
456	12.5	5	5	good
457	12.5	5	5	good
458	12.5	5	5	good
459	12.5	5	5	good
508	12.5	5	5	
694	12.5	5		
861	12.5	4		
868	12.5	4		
937	12.5	4		
Reference: 				
	12.5	5	1	

Industrial Applicability:

[0092] The compounds of the present invention have excellent fungicidal effectiveness, and therefore, are useful as a fungicide for agricultural and horticultural use.

Claims

1. Benzamidoxime derivatives represented by the formula (I);

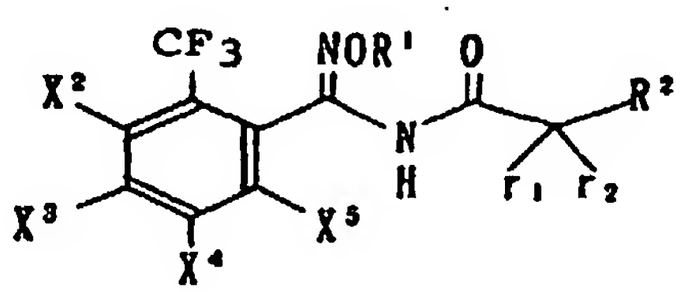


... (I)

wherein

R^1 is unsubstituted or substituted C_1-C_4 alkyl, unsubstituted or substituted C_2-C_4 alkenyl or unsubstituted or substituted C_2-C_4 alkynyl,
R^2 is phenyl optionally having substituents or heterocycle optionally having substituents,
X^2, X^3, X^4 and X^5 are each independently hydrogen, halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1- C_4 alkyoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, nitro, amino or C_1-C_4 alkylcarbonylamino,
and r_1 and r_2 are each independently hydrogen, halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 alkylthio or amino, or r_1 and r_2 together may form a carbonyl.

2. Benzamidoxime derivatives represented by the formula (I');

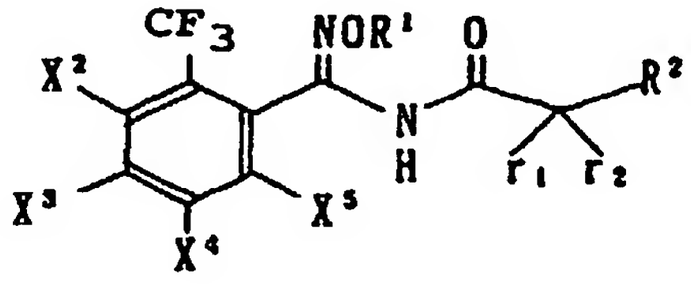


... (I')

wherein

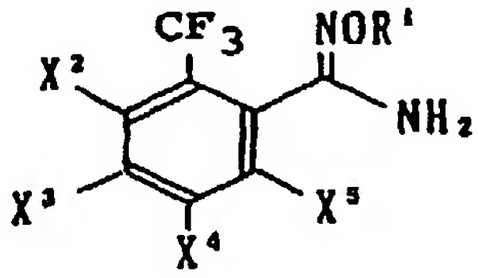
R^1 is stralght-chain or branched C_1-C_4 alkyl; a group represented by a general formula, R^3CH_2, wherein R^3 is a group selected from the group consisting of C_3-C_8 cycloalkyl, C_1-C_3 haloalkyl, C_1-C_3 alkoxy, C_1-C_3 alkylthio, C_1-C_3 alkylsulfinyl, C_1-C_3 alkylsulfonyl, C_1-C_3 alkoxycarbonyl, cyano, amino, C_1-C_3 monoalkylamino, C_1-C_3 dialkylamino, acylamino and cyano C_2-C_4 alkenyl or C_2-C_4 alkynyl,
R^2 is phenyl optionally having one or more substituents selected from the group consisting of halogen, C_1-C_3 alkyl, C_1-C_3 alkoxy, C_1-C_3 haloalkyl and C_1-C_3 haloalkoxy; or 5- or 6-membered aromatic heterocycle containing 1 to 4 heteroatoms or one or more species selected from a group consisting of nitrogen, oxygen and sulphur, those which are optionally having one or more substituents selected from a group consisting of halogen, C_1-C_3 alkyl, C_1-C_3 alkoxy, C_1-C_3 haloalkyl and C_1-C_3 haloalkoxy,
X^2, X^3, X^4 and X^5 are each independently hydrogen, halogen, C_1-C_4 alkyl, C_1-C_4 ahloakyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, nitro, amino or C_1-C_4 alkylcarbonylamino, and r_1 and r_2 are each independently hydrogen, halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 alkylthio or amino, or r_1 and r_2 together may form carbonyl.

3. A process for preparation of benzamidoxime derivatives represented by the formula (I);



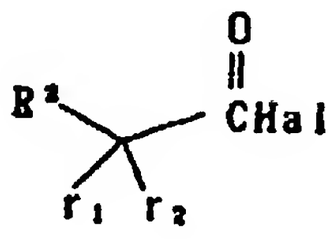
... (I)

wherein R^1, X^2, X^3, X^4, X^5, R^2, r_1 and r_2 are as described above, which comprises reacting a compound represented by the formula (II)



... (II)

wherein R^1, X^3, X^4 and X^5 are as described above, with a compound represented by the formula (III);



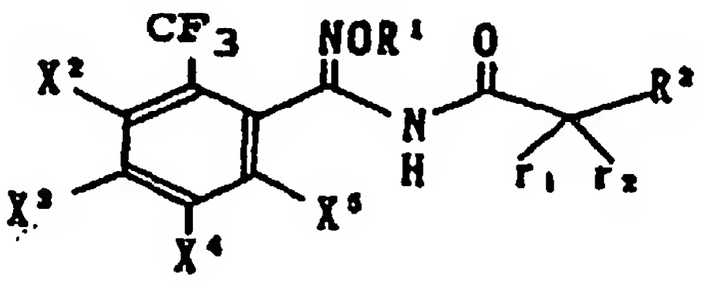
... (III)

wherein Hal represents halogen, and R^2, r_1 and r_2 are as described above.

4. A fungicide for agricultural and horticultural use, comprising one or more of the benzamidoxime derivatives as defined in claim 1 or 2.

Patentansprüche

1. Benzamidoxim-Derivate, angegeben durch die Formel (I);



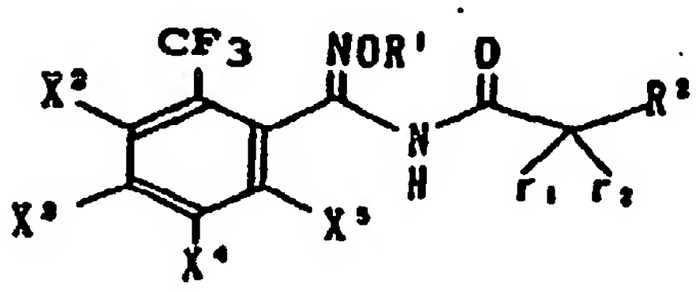
... (I)

worin

R^1 unsubstituiertes oder substituiertes C_1-C_4-Alkyl, unsubstituiertes oder substituiertes C_2-C_4-Alkenyl oder unsubstituiertes oder substituiertes C_2-C_4-Alkinyl ist,
R^2 Phenyl, gegebenenfalls Substituenten aufweisend, oder ein Heterocyclus, gegebenenfalls Substituenten aufweisend, ist,

X^2, X^3, X^4 und X^5 jeweils unabhängig für Wasserstoff, Halogen, C_1-C_4-Alkyl, C_1-C_4-Halogenalkyl, C_1-C_4-Alkoxy, C_1-C_4-Halogenalkoxy, C_1-C_4-Alkylthio, C_1-C_4-Alkylsulfinyl, C_1-C_4-Alkylsulfonyl, Nitro, Amino oder C_1-C_4-Alkylcarbonylamino, stehen,
und r_1 und r_2 jeweils unabhängig für Wasserstoff, Halogen, C_1-C_4-Alkyl, C_1-C_4-Halogenalkyl, C_1-C_4-Alkoxy, C_1-C_4-Alkylthio oder Amino stehen, oder r_1 und r_2 zusammen ein Carbonyl bilden können.

2. Benzamidoxim-Derivate, angegeben durch die Formel (I');

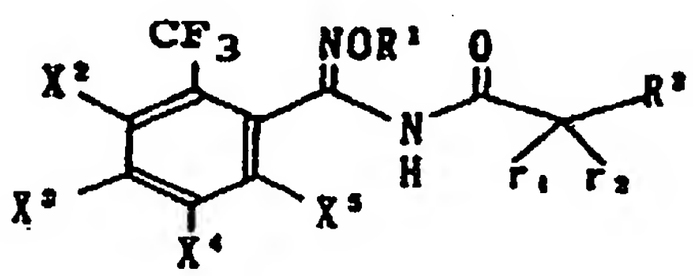


... (I')

worin

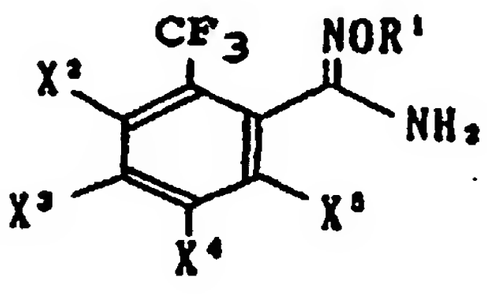
R^1 geradkettiges oder verzweigtes C_1-C_4-Alkyl; eine Gruppe, repräsentiert durch die allgemeine Formel R^3CH_2, worin R^3 eine Gruppe ist, die aus der Gruppe gewählt wird, bestehend aus C_3-C_8-Cycloalkyl, C_1-C_3-Halogenalkyl, C_1-C_3-Alkoxy, C_1-C_3-Alkylthio, C_1-C_3-Alkylsulfinyl, C_1-C_3-Alkylsulfonyl, C_1-C_3-Alkoxycarbonyl, Cyano, Amino, C_1-C_3-Monoalkylamino, C_1-C_3-Dialkylamino, Acylamino und Cyano-C_2-C_4-alkenyl oder C_2-C_4-Alkinyl, ist,
R^2 Phenyl, das gegebenenfalls ein oder mehrere Substituenten aufweist, gewählt aus der Gruppe, bestehend aus Halogen, C_1-C_3-Alkyl, C_1-C_3-Alkoxy, C_1-C_3-Halogenalkyl und C_1-C_3-Halogenalkoxy; oder ein 5- oder 6-gliedriger aromatischer Heterocyclus mit 1 bis 4 Heteroatomen oder einer oder mehreren Spezies, gewählt aus der Gruppe, bestehend aus Stickstoff, Sauerstoff und Schwefel, ist, wobei jene, welche gegebenenfalls ein oder mehrere Substituenten aufweisen, von der Gruppe gewählt sind, die aus Halogen, C_1-C_3-Alkyl, C_1-C_3-Alkoxy, C_1-C_3-Halogenalkyl und C_1-C_3-Halogenalkoxy besteht,
X^2, X^3, X^4 und X^5 jeweils unabhängig für Wasserstoff, Halogen, C_1-C_4-Alkyl, C_1-C_4-Halogenalkyl, C_1-C_4-Alkoxy, C_1-C_4-Halogenalkoxy, C_1-C_4-Alkylthio, C_1-C_4-Alkylsulfinyl, C_1-C_4-Alkylsulfonyl, Nitro, Amino oder C_1-C_4-Alkylcarbonylamino stehen,
und r_1 und r_2 jeweils unabhängig für Wasserstoff, Halogen, C_1-C_4-Alkyl, C_1-C_4-Halogenalkyl, C_1-C_4-Alkoxy, C_1-C_4-Alkylthio oder Amino stehen, oder r_1 und r_2 zusammen Carbonyl bilden können.

3. Verfahren zur Herstellung von Benzamidoxim-Derivaten, angegeben durch die Formel (I);



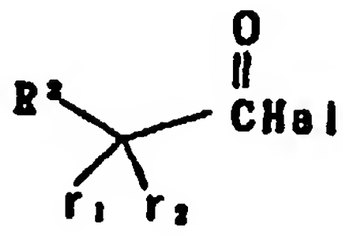
... (I)

worin R^1, X^2, X^3, X^4, X^5, R^2, r_1 und r_2 wie oben beschrieben sind, welches die Umsetzung einer Verbindung der Formel (II)



... (II)

worin R^1, X^3, X^4 und X^5 wie oben beschrieben sind, mit einer Verbindung der Formel (III);



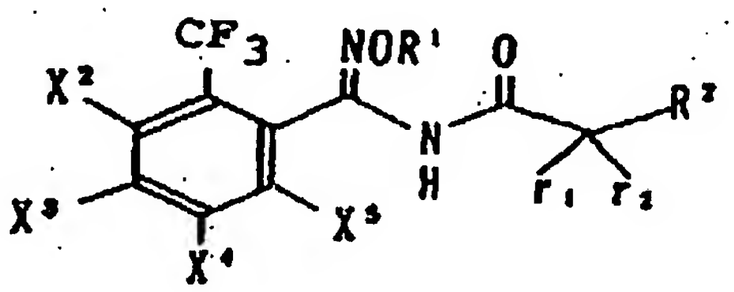
... (III)

worin Hal für Halogen steht und R^2, r_1 und r_2 wie oben beschrieben sind, umfasst.

4. Fungizid zur landwirtschaftlichen oder gartenbaulichen Verwendung, umfassend ein oder mehrere der Benzamidoxim-Derivate, wie sie in Anspruch 1 oder 2 definiert sind.

Revendications

1. Dérivés du benzamidoxime représentés par la formule (I) :

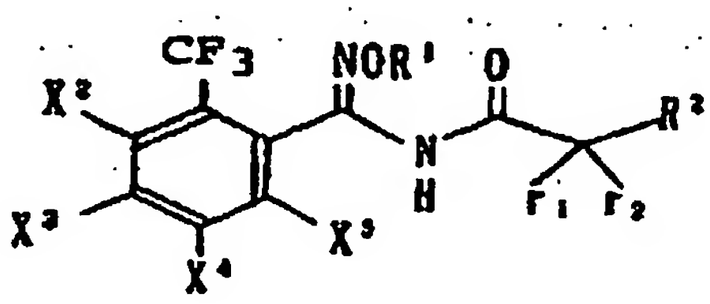


... (I)

dans laquelle

R^1 est un alkyle en C_1 à C_4 non substitué ou substitué, un alcényle en C_2 à C_4 non substitué ou substitué ou un alcynyle en C_2 à C_4 non substitué ou substitué,
R^2 est un phényle ayant éventuellement des substituants ou un hétérocycle ayant éventuellement des substituants,
X^2, X^3, X^4 et X^5 sont chacun indépendamment un hydrogène, un halogène, un alkyle en C_1 à C_4, un halogénoalkyle en C_1 à C_4, un alkyloxy en C_1 à C_4, un halogénoalcoxy en C_1 à C_4, un alkylthio en C_1 à C_4, un alkylsulfinyle en C_1 à C_4, un alkylsulfonyle en C_1 à C_4, un nitro, un amino ou un alkylcarbonylamino en C_1 à C_4, et r_1 et r_2 sont chacun indépendamment un hydrogène, un halogène, un alkyle en C_1 à C_4, un halogénoalkyle en Cl à C_4, un alcoxy en C_1 à C_4, un alkylthio en C_1 à C_4 ou un amino, ou r_1 et r_2 ensemble peuvent former un carbonyle.

2. Dérivés du benzamidoxime représentés par la formule (I') :



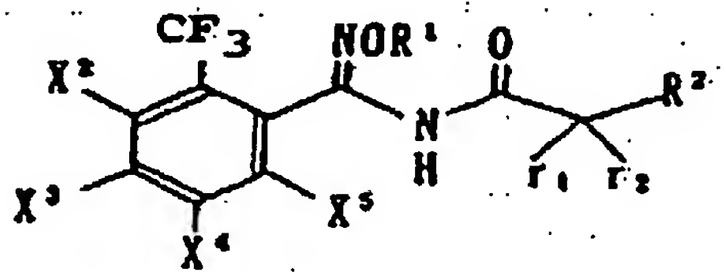
... (I')

dans laquelle

R^1 est un alkyle en C_1 à C_4 à chaîne linéaire ou ramifié ; un groupe représenté par une formule générale, R^3CH_2, dans laquelle R^3 est un groupe choisi dans le groupe constitué par un cycloalkyle en C_3 à C_8, un halogénoalkyle en C_1 à C_3, un alcoxy en C_1 à C_3, un alkylthio en C_1 à C_3, un alkylsulfinyle en C_1 à C_3, un

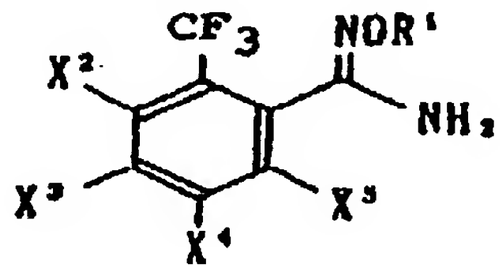
alkylsulfonyle en C_1 à C_3, un alcoxycarbonyle en C_1 à C_3, un cyano, un amino, un monoalkylamino en C_1 à C_3, un dialkylamino en C_1 à C_3, un acylamino et un cyano alcényle en C_2 à C_4 ou alcynyle en C_2 à C_4,
R^2 est un phényle ayant éventuellement un ou plusieurs substituants choisis dans le groupe constitué par un halogène, un alkyle en C_1 à C_3, un alcoxy en C_1 à C_3, un halogénoalkyle en C_1 à C_3 et un halogénoalcoxy en C_1 à C_3 ; ou un hétérocycle aromatique à 5 ou 6 membres contenant 1 à 4 hétéroatomes ou une ou plusieurs espèces choisies dans le groupe constitué par l'azote, l'oxygène et le soufre, celles qui ont éventuellement un ou plusieurs substituants choisis dans un groupe constitué par un halogène, un alkyle en C_1 à C_3, un alcoxy en C_1 à C_3, un halogénoalkyle en C_1 à C_3 et un halogénoalcoxy en C_1 à C_3,
X^2, X^3, X^4 et X^5 sont chacun indépendamment un hydrogène, un halogène, un alkyle en C_1 à C_4, un halogénoalkyle en C_1 à C_4, un alcoxy en C_1 à C_4, un halogénoalcoxy en C_1 à C_4, un alkylthio en C_1 à C_4, un alkylsulfinyle en C_1 à C_4, un alkylsulfonyle en C_1 à C_4, un nitro, un amino ou un alkylcarbonylamino en C_1 à C_4,
et r_1 et r_2 sont chacun indépendamment un hydrogène, un halogène, un alkyle en C_1 à C_4, un halogénoalkyle en C_1 à C_4, un alcoxy en C_1 à C_4, un alkylthio en C_1 à C_4 ou un amino, ou r_1 et r_2 ensemble peuvent former un carbonyle.

3. Procédé de préparation de dérivés du benzamidoxime représentés par la formule (I) :



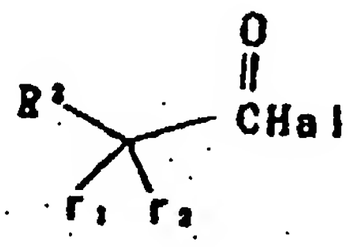
. . . (I)

dans laquelle R^1, X^2, X^3, X^4, X^5, R^2, r_1 et r_2 sont tels que décrits ci-dessus, qui consiste à faire réagir un composé représenté par la formule (II)



. . . (II)

dans laquelle R^1, X^3, X^4 et X^5 sont tels que décrits ci-dessus, avec un composé représenté par la formule (III) :



. . . (III)

dans laquelle Hal représente un halogène, et R^2, r_1 et r_2 sont tels que décrits ci-dessus.

4. Fongicide pour une utilisation agricole et horticole, comprenant un ou plusieurs des dérivés du benzamidoxime selon la revendication 1 ou 2.